The Chemical Age

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Contents

	PAGE
EDITORIAL NOTES: A Quick Election: Reclaimed Lubricants: British and American Methods	531
Progress of the British Empire Exhibition	534
Random Reflexes—VI.	535
Dr. Armstrong on the New Chemists	538
American Non-Ferrous Metallurgy: Society of Public Analysts	539
The Problem of Corrosion	540
Absorption Towers and Filters	541
Chemical Trade in October	542
Research on Colour Intermediates	543
Van der Waals Memorial Lecture	544
From Week to Week	546
References to Current Literature	547
Patent Literature	548
Market Reports and Current Prices	551
Company News: Trade Inquiries	556
Commercial Intelligence	558

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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A Quick Election

To the business man a general election is always something of a nuisance, and the one with which the nation is now suddenly confronted is no exception. At a time when the official returns show our trade to be gradually recovering and something like industrial peace seems in view, it is regrettable to have the nation's attention distracted from business by the discussion of political problems. The one satisfaction in the present case is that instead of dragging along for days or weeks the issue will be decided on one day, and no constituency will be influenced by the verdict of others. The nomination day is Monday, November 26, and the polling day Thursday, December 6. So that within scarcely more than three weeks of the Prime Minister's announcement the nation will have delivered its judgment. Whatever that may be, it will at least settle matters for a time. That, in itself, is no small advantage, for there are few things the business man dislikes more than suspense and uncertainty.

The issues before the country have not been defined in very exact terms, and there must inevitably be considerable cross-thinking and cross-voting with parties organised as they are to-day. But, broadly, the main issue promises to be between our traditional Free Trade policy and some form of Imperial preference. The Conservative party will support preference; the Liberal party, suddenly united, at least in appearance, by an understanding between Mr. Asquith and Mr. Lloyd George, will stand for Free Trade; the Labour Party—well, nobody quite knows what it stands for, or whether one should watch its head or its tail for a sign. To support Protection would be to ally itself with its natural enemies. To support Free Trade would be to repudiate the intensely protectionist principle on which all trade union policy is based. Its own contribution is more likely, perhaps, to be some capital levy proposal devised by men who have never run even a back-street shop and whose knowledge of the finance of industry is at the best doctrinaire. It will be a curiously mixed election in many ways, and more people than usual will find it difficult to select any one party or policy to which they can give unqualified support. It will be a case of standing for one or two big things and letting the rest go.

Reclaimed Lubricants

MR. WILLIAM LEE'S paper before the Society of Engineers on the properties of lubricants, an abstract of which was given in our last issue, was one of those practical contributions which demand much more careful attention than is frequently given to them. We have come across chemical, as well as mechanical, engineers who have been amazed when they have taken up the question of the cost of lubricants on their own works. In many instances the exercise of keener supervision, coupled with the correct choice of oils, etc., has led to a reduction of 50 per cent. in the actual bill for lubrication, apart from the economy which has been effected in the wear and tear by a process of correct selection. Within recent years there has been a growing and praiseworthy attempt to make use of reclaimed oils, and it would have been helpful as well as interesting if Mr. Lee had summarised his conclusions as to the ultimate effects of the use of these oils from an economic standpoint. The method employed in reclamation must, of course, have an important bearing on the results, and it is instructive to recall some recent work carried out in America, where by the use of a coagulent it was found that reclaimed oils could be obtained which would stand the usually accepted tests, such as viscosity, flash point, and sediment; although the flash point was slightly lowered. Perhaps one of the most pertinent considerations is the reduction of organic acidity, although in some quarters it is now held that the necessity for reducing this acidity to a low value is open to question, since there appears to be no danger that the acidity would ever become sufficiently marked to cause corrosion, except in the case of lead and zinc.

The cause of sludge formation in a used lubricating oil is not at all clear, but it appears to differ from an emulsion in requiring some considerable time for its

development. As an oil continues in use for some time it accumulates dust, carbon, and other materials in a finely divided state, and the most probable explanation would seem to be that the sludge is a case of a permanent emulsion due to carbon or dust in a colloidal condition. However this may be, it is evident that all finely divided as well as coarse impurities should be removed from used oils in reclaiming them.

British and American Methods

DR. WALTER ROSENHAIN, in his address to the London Section of the Institute of Metals, gave some interesting impressions of American non-ferrous metallurgy gained during a recent visit to the United States. His comparison of British and American methods is not entirely unfavourable to this country. In the immense scale and development of industry, in organisation for mass production, in insistence on maximum output from machines and from men, in eagerness to employ labour-saving devices—in all these matters the American leads the way. Also, American chemical students, as soon as they leave college, are so quickly absorbed in industry that it is difficult to reserve a sufficient number for the less lucrative, but indispensable, work of research. It is in the last point that we come out of the comparison best. For Dr. Rosenhain, though he seems to have looked with unbiassed eyes on what came before him, found the standard of pure research below what it is here. His conclusion is that American metallurgy looks for its scientific stimulus to this country rather than to its own men of science, but easily surpasses us in the application of the knowledge to industrial uses. He found, too, that many of the instruments used were by British makers such as Hilger.

Another opinion may be worth recording. Dr. D. B. Lake, a New York research chemist, looked in to see us the other day during a visit he is paying to France and this country. Contrary to the common impression, he found the firms in the paint and varnish industry, the field to which his inquiries relate, most willing to show their plant and discuss their methods. In methods of production, plant design, etc., he found but little difference, but he missed the liberal provision in America for applied research on problems relating to the use of paints and varnishes. For instance, a long course of research over there solved the question of the right paint for ship bottoms, and another is proceeding into the effect on paints of the various materials to which it is applied. In addition, arrangements are made by which any particular problem troubling the individual manufacturer may be promptly investigated at a moderate cost. As against this, however, Dr. Lake found the British business man more widely educated. The American talks his own business well, but he talks well on little else, because that absorbs his whole mind. Here Dr. Lake found among business men a wider mental interest and outlook, taking in politics, art, literature, and so forth. These generalisations, though interesting, are not always to be accepted too literally, but they suggest an old moral. Too early and too intensive specialisation, in whatever field, though it makes for high efficiency in one groove, limits the vision, and in the end it is the wider vision that counts.

The Club's First President

THE Chemical Industry Club has at last decided to have a president, and at the annual meeting on Monday, Sir William Pope was elected to the office. The appointment is in every way a good one. Sir William Pope has taken a friendly and helpful interest in the Club's affairs for some time, and in the position of president will be more than a mere ornament. Dr. Hodgkinson becomes the first vice-president. The new treasurer is Mr. Miller-Jones, who may be trusted to give to the office the attention and tact which have made him successful in business, and which are already promising success in the Parliamentary candidature he has undertaken in the Limehouse Division. With the annual meeting Mr. Craig retired from the chairmanship of the executive, after two years' useful work, and Mr. Coley received perhaps the neatest compliment that could be paid to his services by being elected his successor. Although a competent secretary has been found in Mr. Arthur Williams, the members decided to retain the office of honorary secretary, and their choice fell upon Dr. E. H. Tripp, who signalised his election by delivering the speech of the evening, and emphasising the democratic and independent character of the Club in terms which almost go beyond what we have ourselves ventured to use.

Though the rate of advance is slower than many would desire, both the membership and the finance of the Club are on a sound basis, and the recent decision to impose an entrance fee is having a stabilising effect in both directions. To the attractions which Mr. Craig once enumerated in a masterly analysis of the dietary table must now be added the new three-shilling Club dinner. This should complete the scheme for the members' material comfort, and with the maintenance of the billiard table in a tolerable state of repair should disarm even the most chronic of grumblers.

Chemists and the Metric System

A STRONG plea was made recently by Mr. A. E. Malpas, chief engineer to the United Alkali Co., for the adoption of the metric system in all chemical works. It is interesting to find in the news edition of *Industrial and Engineering Chemistry* an equally strong plea for its adoption throughout the United States chemical industry. Apart from the general argument in favour of a symmetrical as against an eccentric system, Mr. Malpas urged the special advantages of the metric system to the process side of chemical industry. In our research departments, he said, we use metric units and centigrade degrees. The scientific literature of the world is expressed in the same units, so that research men and scientific men talk the same language. In our works and processes, however, the use of British units and Fahrenheit degrees continues, with the result that the men in charge of a process use and think in different units from the research men who worked out the process. In spite of the fact that the metric system was once in use at Widnes and was dropped, Mr. Malpas's audience declared strongly in favour of its re-introduction.

Though in the United States they are ahead of us in this matter, to the extent of having a decimal

coinage, the short ton and the 100-lb. unit, the use of the metric system is so far incomplete that the American Chemical Society has a Metric System Committee which serves as a "proponent" agency, a word with a rather metric flavour about it. The chairman, Professor E. C. Bingham, puts the case on higher than merely arithmetical grounds; he tells us that the movement for universal weights and measures is a movement towards world peace and progress, though unhappily it is not producing its proper effect among the European nations which use it. Beyond this, by instructive details as to pounds, quarts, yards, and other terms, he shows how simple the change to metric use would be and how advantageous. Now all these arguments for universal weights and measures, a universal tongue, and so on, are theoretically irresistible. But it would add heavily to the monotony of life to have to think always in the same terms, and the British nature clings obstinately to a love of variety and distinction, even at the cost of some degree of efficiency. Standardised suits, as we well remember, were cheaper than the West End cut, but none too nice to wear, and standardised cookery, though more economical, might be less appetising, and even Americans, instead of furnishing their houses with perfect machine-tooled furniture, have been known to prefer the genuine hand-made products of Wycombe. Theoretically, like our neglect of metrical order, all this is inexcusable, but being a poetical as well as a practical people, we shall probably provide work for the metric system "proponents" for some time yet.

Improved Trade Returns

THE marked improvement in our overseas trade, indicated in the October trade returns, is distinctly encouraging, and will set business firms once more looking for the realisation of the hopes of a real advance which have too often in the past only existed to tantalise them. During October there has been an increase in the value of British imports of 14 million pounds and ten million pounds increase in exports compared with last year. It is satisfactory to note that the overseas chemical trade has fully shared in the general improvement, and the slight advance noted last month has been more than maintained. The figures given in the official returns under the heading chemicals, dyes, drugs and colours are up by nearly £300,000 in imports over last year, and by nearly £1,000,000 in exports. Both figures represent increases over those for September of some £200,000, so that not only is the trade in a considerably better position than last year, but it has made a marked advance during the past month. This increase has not been secured by any very great demand for one product, but is common to nearly all the items mentioned in the official returns. The products from coal tar, which have shown a very satisfactory increase in exports for some months, have, if anything, further improved, and British prepared synthetic dyes have been exported in four times last year's quantity. A large number of other items have also been exported in increased quantity, so that, so far as the overseas trade is concerned, the present position of the industry is now definitely better than it has been for many months, which is particularly gratifying in view of the continued unsatisfactory state of European politics.

Points from Our News Pages

The Palaces of Industry and Engineering at the British Empire Exhibition were handed over by the contractors to the Exhibition Authorities (p. 534).

Reports are published of papers read before the Institute of Metals (p. 539), the Society of Public Analysts (p. 539), the Oil and Colour Chemists' Association (p. 540), the Institution of Chemical Engineers (p. 541), the Chemical Society (p. 544), the Birmingham Chemical Society and the Society of Chemical Industry (p. 543), and others.

An analysis of the official returns of the chemical imports and exports during October is given (p. 542).

According to our London Market Report trade during the past week has been fairly satisfactory (p. 551).

Business in the Scottish Chemical Market during the past week has shown some slight improvement, according to our report (p. 554).

Books Received

COKE AND ITS USES. By E. W. L. Nicol. London: Ernest Benn, Ltd. Pp. 132. 19s. 6d.

COAL TAR DISTILLATION. By Arthur R. Warnes. London: Ernest Benn, Ltd. Pp. 512. 45s.

THE CHEMISTRY OF RUBBER. By Mr. B. D. W. Luff. London: Ernest Benn, Ltd. Pp. 232. 25s.

THE CHEMICAL ELEMENTS. By F. H. Loring. London: Methuen and Co., Ltd. Pp. 172. 8s. 6d.

MANIPULATIONS DE CHIMIE COLLOIDALE. By Wo. Ostwald. Paris: Gauthier-Villars et Cie. Pp. 202. 10 fr.

THE MICRO-ORGANISMS OF THE SOIL. By Sir John Russell. London: Longmans, Green and Co. Pp. 188. 7s. 6d.

THE CHEMISTRY OF PAINTS, PIGMENTS AND VARNISHES. By J. Gauld Bearn. London: Ernest Benn, Ltd. Pp. 278. 30s.

VARNISHES AND THEIR COMPONENTS. By Dr. R. S. Morrell. London: Henry Frowde. Hodder and Stoughton. Pp. 362. 25s.

CHEMISTRY APPLIED TO HOME AND COMMUNITY. By Pauline G. Beery. London and Philadelphia: J. B. Lippincott Co. Pp. 534. 15s.

VALENCE AND THE STRUCTURE OF ATOMS AND MOLECULES. By Gilbert N. Lewis. New York: The Chemical Catalog Co., Inc. Pp. 172. $3.

A COMPREHENSIVE TREATISE ON INORGANIC AND THEORETICAL CHEMISTRY. Vol. IV. By Dr. J. W. Mellor. London: Longmans, Green and Co. Pp. 1074. 63s.

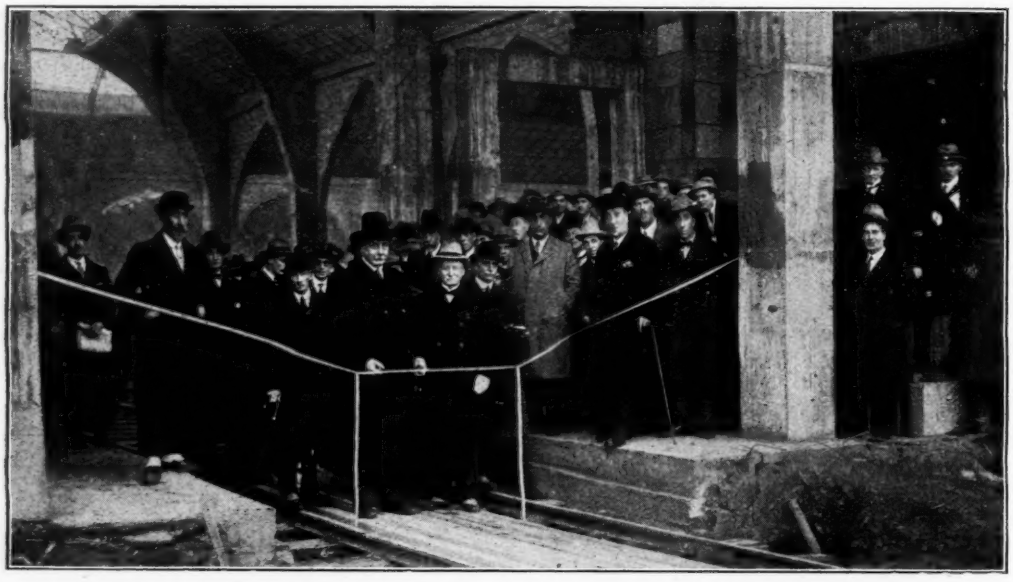
The Calendar

Nov.		
19	Chemical Industry Club: "Gold Mining in Ontario." Mr. Wm. Noxon. 8 p.m.	2, Whitehall Court, London, S.W.
19	Institution of the Rubber Industry (Manchester Section): Paper by Mr. C. A. Fryer. 7.30 p.m.	Midland Hotel, Manchester.
20	West Yorkshire Metallurgical Society. 7.30 p.m.	George Hotel, Huddersfield.
20	Society of Dyers and Colourists (Midlands Section): "Bleaching with Hydrogen Peroxide." Mr. I. E. Weber.	Leicester.
21	Society of Glass Technology.	Leeds.
22	Royal Society. 4.30 p.m.	Burlington House, Piccadilly, London
22	Society of Dyers and Colourists (London Section): "Macbeth Artificial Daylight, and the Fade-ometer." Mr. A. D. Lang. 7 p.m.	Dyers' Hall, Dowgate Hill, London.
23	Society of Chemical Industry (Manchester Section): Annual Dinner. 7.30 p.m.	Queen's Hotel, Manchester.
26	Chemical Industry Club: Annual Dinner. 7.30 p.m.	Connaught Rooms, London.

Progress of the British Empire Exhibition.

Palaces of Engineering and Industry Completed.

On Monday proof of the rapid progress of the work in connection with the British Empire Exhibition at Wembley was furnished by the ceremony of formally handing over the Palace of Engineering and the Palace of Industry which, with the Government Pavilion, will house the United Kingdom exhibit. The Chemistry Section, as already stated, will be in the Palace of Industry, admirably situated alongside one of the main avenues, and so well advanced are the preparations that chemical exhibitors were almost immediately at work on their stands. The position of the Chemical Hall is an ideal one. Visitors to the exhibition arriving at Wembley Park Station enter at the North Entrance, and the Palace of Industry is on the right hand side of the Main Avenue, which runs straight to the Stadium—north to south. The Chemical Hall is in the north-east corner of the Palace of Industry: it is surrounded by two of the 75 ft. gangways, and there are three main entrances to it. The exhibits are grouped roughly in five divisions: Heavy Chemicals; Dyestuffs and Intermediates; Fine Chemicals; Soap and Perfumery; Scientific.



"C. A." Photograph

The Opening Ceremony.

In the presence of a large party on Monday, Sir Robert McAlpine, the contractor, formally handed over to the exhibition authorities the two immense ferro-concrete buildings, which jointly cover 23 acres. They have taken about a year to build, and have cost over £500,000.

In formally handing an illuminated key to Sir Travers Clarke, the deputy chairman of the exhibition board, who accepted the buildings from the contractors, Sir Robert McAlpine recalled the day, 50 years ago, when he was not allowed to put up a concrete building because the owners were afraid they would not be able to get any ground rents, presumably because every one expected the building to fall down. The completion of these two palaces had given him the greatest satisfaction, for they were a demonstration that reinforced concrete construction had become an exact science. "There is no material I know," he went on, "which may be made so useful to man as concrete. It has the elements of stability, durability, great strength, and it lends itself to the art of a craftsman owing to its plastic nature in the initial stages of construction. It obviates the necessity for quarrying stone, and by its aid I am sure most artistic buildings can be designed."

Sir Travers Clarke, in accepting the buildings, mentioned as a very hopeful circumstance for the realisation of the board's ambition to open the exhibition on the chosen date, that in June, 1922, the contractors undertook to hand the buildings over on November 15, 1923. They had done so with a day or two to spare. These two magnificent halls might be described as the corner-stones of the exhibition, and he hoped that with the close of the year all the constructional work would be finished.

Palace of Industry

The Palace of Industry will include the following main sections:—

Chemicals, heavy and fine, with soaps, perfumery and paints, matches, etc., will occupy 37,500 sq. ft. The central feature will be an exhibit of research in pure chemistry, in which the Association of British Chemical Manufacturers, which has organised the whole Chemical Section, is being aided by the Royal Society and the various chemical societies.

Cotton Textiles will occupy 32,187 sq. ft. A representative committee covering all Lancashire cotton interests has organised this section. The whole story of cotton production will be illustrated, from the growing of the raw material to a complete working range of every kind of cotton textile machinery, ending in groups of exhibits of every sort of finished product.

Wool Textiles will fill 15,000 sq. ft. A powerful committee at Bradford is organising this section for the English woollen and worsted textile industry.

Miscellaneous Textiles will fill 12,000 sq. ft. This section includes hosiery, hats, trimmings, etc.

Ulster and her industries will occupy 6,187 sq. ft. The unique status of the Government of Northern Ireland within the Empire is emphasised at the exhibition. Instead of having a separate pavilion in the grounds, the Government has taken one of the most prominent corners in the Palace of Industry, and is organising there a show of the principal Ulster industries, including shipbuilding, flax and linen and beverages.

Watches, Clocks and Jewellery will occupy 5,637 sq. ft. adjoining the Ulster exhibit, a comparatively small but choice show.

The Gas Industry will take up 12,837 sq. ft., and will be handsomely represented by a great composite exhibit. Here will be seen every device for lighting, heating and cooking by gas.

BUILDING, SANITATION, CENTRAL HEATING AND METAL INDUSTRIES, occupying 14,867 sq. ft., will include also the characteristic British industry of safes and strong room building.

MUSICAL INSTRUMENTS.—The music trades are occupying not less than 25,222 sq. ft., with a remarkable composite exhibit in which every section of the trade is contributing, under the leadership of the Music Trades' Federation. Here the visitor will be able to hear every sort of British instrument in a series of soundproof rooms.

PAPER, STATIONERY AND ALLIED TRADES will occupy 11,250 sq. ft. The foundation of this section is a notable working exhibit which is being organised by the Paper Makers' Association. A special machine is being built to show the complete process of paper manufacture.

FURNITURE AND DECORATIVE TEXTILES.—The furnishing section will cover an area of 20,950 sq. ft. The United Kingdom is supreme in the linoleum trade, which will make an especially bold show in this section.

FOOD, BEVERAGES AND TOBACCO, occupying 43,187 sq. ft., will be the largest individual section in this Palace. Complete working exhibits will be a special feature.

LEATHER AND BOOTS occupy 10,000 sq. ft. with representative exhibits, staged under the auspices of the Incorporated Federated Associations of Boot and Shoe Manufacturers, the United Tanners' Association, the Federation of Curriers, and other trade organisations.

POTTERY AND GLASS will fill 12,812 sq. ft., with a selection of exhibits by world-famous pottery and glass firms.

SPORTS, GAMES AND TOYS occupy 4,312 sq. ft., and DOMESTIC UTILITIES AND FANCY GOODS occupy 4,312 sq. ft. This section will be devoted to exhibits of special interest to the housewife.

RUBBER MANUFACTURES will occupy 7,187 sq. ft. This section has been organised by the India Rubber Manufacturers' Association, and will show the increasing variety of uses to which this essentially Imperial product is being put.

Palace of Engineering

THE SHIPBUILDING, MARINE, MECHANICAL AND GENERAL ENGINEERING SECTION, which is being organised by the British Engineers' Association, will occupy a very large section in the Palace of Engineering, and will probably form the largest display of general engineering that has ever been held in any one exhibition.

THE ELECTRICAL ENGINEERING SECTION, which is being organised by the British Electrical and Allied Manufacturers' Association, will form another most important section in every way worthy of the electrical and allied industries of this country.

THE MOTOR TRANSPORT SECTION, which is being organised by the Society of Motor Manufacturers and Traders, will contain representative exhibits of motor cars, motors and accessories, and will constitute within itself a complete and attractive exhibition of a form of modern activity which always commands public interest.

In the LAND TRANSPORT SECTION will be found the great railway companies, and, associated with them, prominent makers of rolling stock and other railway and tramway appliances.

In the SEA TRANSPORT SECTION will be shown exhibits of the great ports of the United Kingdom, supported by the chief steamship companies.

Colloids as Hydropsical Anasarks

Randy's Reflexes.—VI.

The Duchess Closes Favourite

> "Probably future progress will depend more on the investigation of the special nature, situation and action of individuals than on the statistical thermodynamic treatment of the average behaviour of the crowd."—Professor Donnan.

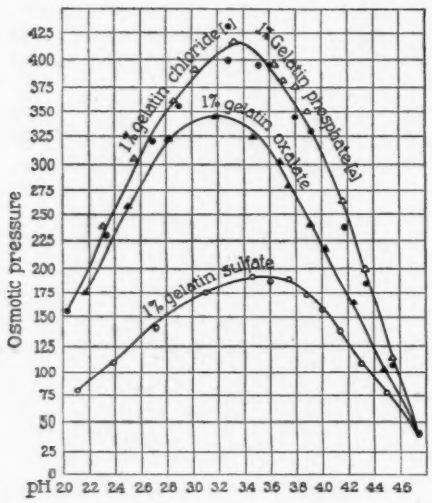
WE'VE set up with our mumps some time and the nursing must go on, as the case is in no way yet out of danger. These colloid mumps *is* different—its not only mixed up with other things but seemingly also with itself. Mr. Mantalini's prescient characterisation—"a demd, damp, moist unpleasant body"—was clearly intended for a colloid. In any case, the property of (true) colloids to which attention has been most attracted of late is that of swelling in water—their hydropsical tendency. It is in this connexion that Donnan's generalisation has been most discussed. There is nothing like leather, it is said—we appreciate this the more since the war, having suffered from its substitutes and the rise in price. Swelling plays a large part in the preparation of leather. The literature on the swelling of skins under the influence of acid is both considerable and learned: reading it, we are reminded of the exclamation attributed to the Israelite, who had had bacon for breakfast, on the outbreak of a thunderstom—"What, all this row about a little bit of pork!" If hell be paved with good intentions, modern leather must reek of ions and every shoe-wearer—though he know it not—must have his feet protected by thermodynamics; hence it is, perhaps, that shoes wear so badly and that the Americans use the term foot-wear, that the bindings of our books don't last as they did, that we are beginning to believe in crêpe-rubber soles.

Not only every woman knows but every child—who has been to a Christmas party—what a jelly is; few chemists do, because it is disguised for them under the name "gel" and they are not taught to consider—What's in a name?—certainly, never how to make a well flavoured jelly. The Wolfcub and his pretentious supporters have disguised its charms in a tangle of meaningless epithets. Jelly proper is gelatin swollen with water. You can't swell out salt, any ordinary salt, with water; why this difference? When gelatin molecules separate from water, they don't follow the instruction sometimes given in the vulgar phrase—"Put your head in a bag"; nor, like Tweedle-dee, do they wrap themselves in umbrellas: no, like birds of a feather, they flock together and form bags of themselves, bags in some way lined with water, however. These collocations act as differential septa, the walls serving to determine what nature of company shall be kept within their precincts. Hence these tears of Loeb. The habit is Loeb's constant refrain and the foundation of his Donnan-worship.

In leather, strong albuminous bags are ready-made in the cells. Procter, a distinguished nothing-like-leather chemist was the first to fathom the part played by asymmetric equilibria in the swelling of skins. He went whole-hoggedly for Donnan's thermodynamics and swallowed all his equations. True it is, these mumps is more than ketching; those infected with the disease must strut like peacocks in their pride of possession. Since Leeds was converted, a nimbus of thermodynamic piety, extending even to the Royal Society, has surrounded the leather trade—indeed its mind has been turned towards the Consecration of Hydrogen Ikons as much as to £ s. d. At a recent discussion, a Battersea sage solemnly pictured the whole scientific future of leather as dependent upon their due worship. The great water-consultant, Dr. Tidy, years ago recommended the *Two-foot-Tube* as a constant travelling companion. The scientifically-minded tanner now has his vision so clouded that he cares little for water but kneels before the Hydrogen electrode by day and dreams of it by night. It is his Kismet. When *Hassan* is off, perhaps a Delius will weave music giving fit broidery to its charms. The Leathersellers' Company is in the seventh heaven of delight at the change that has overcome its industry—fortunately, Mr. Saintsbury's proclivities are not entirely out of fashion in the sober, leisure moments of the Guild and dryness is still appraised in terms of Moet: may it flourish for ever on such rational lines.

Gelatin pure and simple has but moderate thirst; dose it with acid and it will drink like a fish, as the saying goes. The course of its thirst is shown in the annexed diagram taken

from Loeb's book, though all sense of proportion is lacking, owing to the adoption of Sörensen's unhappy logarithmic mode of indicating "real-acidity" values, which takes all starch out of the facts, reducing to even pleats crinoline flounces of graduated but fast increasing width.



The experiment consisted in placing one-per-cent. solutions of the originally isoelectric protein, together with a certain amount of an acid or alkali to give it a definite "real-normality," in collodion bags fitted with a manometer tube; the bag was dropped into a beaker containing 350 cc. of liquid of the same normality as that put into the bag. Osmotic equilibrium was usually established within abqut six hours.

Loeb's book is full of graphs such as that we have reproduced. They all show that it is possible for gelatin to have too much of a good thing, even when it takes the shape of acid; so they may well be referred to as *Too-much-of-a-muchness* curves—alternatively, for short, as Boomerangs.

Let us consider the gelatin chloride bo merang. The osmotic effect has its least value for the gelatin proper; there can be little doubt that the highes. value is attained at the moment the protein salt (chloride) is fully formed. The subsequent fall, as the acid is added in excess, must be due to the counter osmotic effect of the acid solution outside in asymmetric equilbrium with the gelatin-chloride-acid-system inside.

The swelling of gelatin granules or of a skin is much more rapid in presence of acid than of water alone, because when acid once passes into the cell a salt is formed which is more attractive of hydrone than is the protein itself. No particular mystery need be associated with the operation and no thermodynamic argument can help us much in understanding it: as already remarked, thermodynamics, like the phrase-rule, doesn't help one to *understand* anything.

The particular feature of Donnan's fancy, which no one thus far has seen reason to gib at, is the assumption that the osmotic effect is exercised only by the assumedly diffusible ions. Loeb actually tells us:

"According to Procter, the gelatin *ion* constituting a jelly of gelatin chloride *cannot diffuse and hence can exercise no osmotic pressure* (our italics), while the chlorine anions in combination with them are retained in the jelly by the electrostatic attraction of the gelatin ion but exert osmotic pressure."

Given a colloid salt, XCl, together with, say, HCl, the assumption made is that equilibrium is attained when the product of the concentration of the chlorine ions of the salt and of the acid ions in the liquid on the one side of the membrane not permeable by XCl is equal to that of the acid ions on the other:

$$x^2 = y\,(y+z),$$

where x is the concentration of H and Cl ions in the outside liquid, y being that of these ions present as free acid inside, z being the concentration of Cl ions combined with gelatin.

This is the form of prayer we are asked to adopt and offer up continually in adoration of colloidal behaviour. Procter makes leather by murmuring the incantation over skins; Loeb would have us view all things colloidal in its light. He uses it, not only because of the proof he has obtained of an asymmetric distribution of the diffusible material (HCl) at osmotic equilibrium but, more particularly, on account of the apparent agreement of his electrometric measurements with the values calculated from the equation under analysis.

Taking the two liquids, by means of hydrogen electrodes, he determined the difference in *real-acidity*; then by means of calomel electrodes in a saturated solution of potassium chloride he measured the difference across the membrane. The results show one difference to be practically equal to the other difference, each being expressed as a potential difference. Donnan had predicted that a potential difference should exist between the two solutions, that given by the relation

$$E = \pi_2 - \pi_1 = 0{\cdot}058 \log \frac{C_1 - C_2}{C_2}$$

He assumed that a potential difference is set up, owing to the tendency of the diffusible ions to equalise their concentrations: in fact he treate i the combination as a concentration cell. The Loeb values are deduced with the aid of this expression.

Loeb, therefore, insists that he has proved the truth of the Donnan generalisation. A. V. Hill, a biologist, who has the unusual qualification of being able and accustomed to swear in thermodamns, with extreme fluency, says, No! not necessarily; any thermodemd explanation coming within the four corners of the cult would do equally well. Loeb retorts through Hitchcock, whose final words we reproduce:

"The striking facts which Loeb has discovered are the existence of a measurable difference in ion concentrations and of a corresponding measurable difference in potential between the solutions on the two sides of the membrane. These facts can be satisfactorily explained by Donnan's theory and Loeb has shown how they can be used to explain other properties of protein solutions, notably the effect of electrolytes on osmotic pressure. Hill has offered no alternative explanation for these facts. Loeb has explained them quantitatively; unless some better quantitative explanation can be proposed, the applicability of Donnan's theory will stand."

This final sentence embodies an argument often used—*e.g.*, (by Professor Finlay), in the amusing tourney started in these columns by Dr. B. Lagueur—but inadmissible, as the excuse was held to be that the historic Baby was "only a little one." It is often possible to expose the fallacy of an explanation, without producing an alternative: no reasonable alternative being in sight at the time. Unfortunately, folks are often taken in by the mathematical: "Let it be granted," followed, a few sentences later, by "It having been shown"; still more often, by a cleric *assertion* followed by an appeal to faith.

Science is neither thimble-rigging nor faith-healing. There is a naïve sentence in Nernst bearing on our contention: "The considerations thus far advanced rest essentially upon a thermodynamic basis. It is in the nature of this method of investigation, when properly applied, to give results which are undoubtedly correct but not particularly illuminating." This "when properly applied" is worth noting—and the conclusion!

It is rash, perhaps, for weaklings like ourselves, making no profession of thermodamns, to call in question the august authority of a Donnan: yet to us it seems that he may not have properly applied his imprecations. Surely, thermodynamically, where there is osmotic equilibrium, every sort of equilibrium must prevail. Has not the thermodamnist tied himself in a knot by wearing Arrhenic blinkers—by thinking only in terms of ions assumed to be mobile? Even this latter is not a justifiable postulate in the case before us. Not only is the protein ion itself incapable of getting through the membrane but the associated negative ion also, being tied to it by the apron string called electrostatic affinity.

Just as Loeb, using the hydrogen electrode, picks out the acid molecules for measurement, ascertaining the real-acidity of the solutions, so, by using the calomel electrode, he but picks out the chlorine ions and determines the excess *chlorinity* in the one liquid. This, however, gives no *operative* potential difference—it does so only in the concentration cell, when uncontrolled movement and interchange of ions across the junction is possible. Swearing for the nonce in hydronodamns,

more Henrico, may we not say, that whatever the distribution of the "solutes," *at osmotic equilibrium*, the effective exchange of molecules of hydrone—which determines equilibrium in all the forms possible, under the conditions—is then equal and opposite from, to and at either side of the membrane?

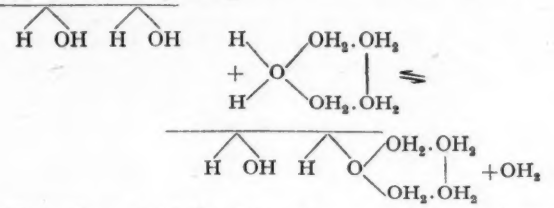
Loeb has given most convincing proof of this relationship. Had he proved what he thinks he has proved, he would have committed that worst of all crimes: a thermodynamic absurdity. In short, we are forced to say "the Donnan equilibrium be thermodamned," in the form hitherto worshipped. Contrariwise: "The Duchess for ever." We may well be content with her simple moral: "The more there is of mine the less there is of yours"—until the time come that the several factors of an asymmetric equilibrium can be properly evaluated.

Instead of being sinner in this matter, however, Loeb seems to us the complete saint. His book is a record of one long series of most careful observations, a mine of wealth to be dug in by those who desire to gain a true appreciation of colloid morals. Only, we have to bear in mind, the material he used cannot have been a definite substance and different gelatins may well vary in behaviour. What matters it, if the reading to be placed upon his results be other than he supposes—if he have given us the facts?

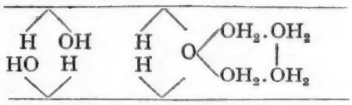
A jelly is but loosely built, yet the cells seem to act definitely as differential septa. As the viscosity of gelatin is increased by conversion into a salt, it is probable that the molecules of the salt are more firmly linked than are those of the protein itself. What then can be the nature of the linkage? It cannot well be otherwise than "hydrous." Here perhaps is an opportunity of using hydronodamns with greater effect than thermodamns.

Gelatinisation, probably, is not an entirely fortuitous process, one in which the units take up their position merely by accident. The molecules may, at first, be carried about in lubberly fashion, by tides in the fluid medium, just colliding, much as the man-of-war cutters did, in the old naval fights, against the sides of the ships they were attacking; but boat-hooks and grappling irons being brought into use, points of attachment being found, like the cutters, they settle into order, collogue and colloid. Unlike the soaps, proteins are provided with numerous points or centres at which affection can be displayed—being built up in the main, of amino-acid residues (polypeptides). This is particularly true of gelatin, constituted as it is mainly of amino-acetic acid or glycine; in point of fact, gelatin is one of the most coherent of all colloids. All sorts of arrangements, in open or closed systems, may be pictured and it is easy to imagine that the jig-saw puzzle might shade into insignificance in comparison with the patterns developed; on the other hand, such is the simplicity of structure, even of complex carbon compounds, that our inclination would be to favour the idea that the molecules ultimately become oriented in a relatively simple way. A more important issue, at the moment, perhaps, at least one more open to suggestion, is: To what extent and in what manner may we picture the molecules in a jelly to be water-logged? Waterlogged they must be, yet in some loose fashion, we may suppose. Here comes the rub. Hitherto, no one has ever speculated on such a problem. Water has been held too common a thing to merit so much consideration. Benzene has given rise to endless strife—water to none, except among men starved of it and at the Parliamentary Bar. Yet it has a far more numerous family of derivatives than benzene and if chemists had eyes for the obvious, they would be mindful of the fact. "Water, water everywhere, yet not a drop to drink," were well modified to—"Yet no one stops to think." Let us attempt to start the ball rolling—the game is not easy, rules are yet to be found, still this should only lend excitement to the chase.

We are told that the great Hydronodynast represented by the modest symbol OH_2 must be postulated as but very sparsely distributed upon dissolved molecules. The ancient chronicler of its ways, however, would have us contemplate other modes of association of "water"—forms which do not make themselves felt osmotically (dynamically). He even hints at these having their origin at points of "hydrolation." Extending this idea, we may picture to ourselves a series of hydrolated points along the lubberly body of a protein molecule, especially if it be in the state of salt. It is conceivable that, at one or more of these, interactions might take place such as the following



The surface would then become more or less waterlogged. If contiguous molecules were concerned, these might even be linked together and a water-film built up between them.



Such films might be several molecules thick. Is this, perhaps, the structure of "capillary water"? The jargon of the day, the talk about surface energy, helps us not at all to understand these matters. Like too much of the talk of the time, it merely substitutes one unknown for another unknown.

It may well be that "waters" of gradually increasing complexity are built up at surfaces by gradual accretion of the element OH_2, much as are the homologous polymethylenes by association of successive increments of CH_2. The differentiating power of "pores," so constituted, in septa, would depend upon their size and the "kind" of water within them. We commend this explanation of "dryness" to chemists generally—especially in the U.S.A. where the belief in molecular suicide has long been universal and the introduction of a moral faith is overdue.

Our reflexions are here broken in upon by the entry of the new water engine—*the Hele-Shaw Filter Press*. Advisedly, we omit *Stream Line* from the title, because we are persuaded that stream-lines—if it have any—have nothing to do with its efficiency: it is, we believe, a molecular water-engine and one of a very remarkable character. We reserve our opinion, to collect our fee for it in advance—having little trust in engineers, either pure or chemical.

Boom in British Dyes

Ruhr Deadlock Opens Mark-Made Markets

THE remarkable rise in the export of British dyestuffs was, according to the latest Board of Trade returns, so firmly maintained during October that the total sold abroad during the year was almost double that of 1922. The rise per month in cwts. was as follows:—

	1922	1923
January	9,494	10,468
February	6,916	8,610
March	7,222	12,149
April	8,485	13,083
May	7,358	16,599
June	7,761	13,864
July	7,765	19,323
August	6,965	18,095
September	9,506	21,333
October	8,036	21,043
Total	80,506	154,567

"The reason why the exports in 1923 are greater than they were in 1922," explained a British dyestuffs expert to a correspondent, "is that political events in Germany have interfered with its steady flow of dyestuffs and the deficit has been made good from British sources of supply. Great Britain to-day has a much better reputation for dyestuffs than any other country in the world, and these figures for the present year are a proof of the good quality of the British article. There is no doubt that if the mark were stabilised and German manufacturers were compelled to calculate their costs on a fixed and permanent basis, the British manufacturer would be able to hold the position now secured in foreign markets. The great asset of the German, in comparison with he British dyestuffs manufacturers, is not the quality of theirt products but the extraordinary ability they show in manipulating their prices and the even more extraordinary fluctuations of the mark."

Dr. Armstrong on the New Chemistry*

Co-operation between Biologist and Chemist

It can be argued that we have just entered on a new stage in chemical investigation. Labours in the main of an analytic type have enabled the exact structure of all but a very few substances to be established; the results have been confirmed by synthetic operations, and most compounds have been built up step by step from their elements. Whilst the modern school of physicists, by a series of most brilliant researches, have learnt much about the nature of the atom, the chemist is now concerned with the behaviour of the molecule. This has entailed the recognition that he has not only to deal with crystals and relatively simple molecules in solution, but also to consider action taking place at the surface of colloid aggregates. As it is probable that the bulk of the reactions in the plant and animal cell are of this nature, their importance will be at once conceded. Further, it must be realised that there is evidence that molecules in solution have a definite space orientation at such colloid surfaces, and, indeed, according to the work of Hardy, at surfaces in general.

According to the accepted space lattice theory of matter there is a definite attraction causing adhesion between each layer of molecules, and consequently at a surface, say, of a piece of glass there are unsatisfied forces or valencies. At first when a drop of a lubricant is placed on such a surface nothing happens, but when two surfaces of glass are moved over one another the molecules of the lubricant become arranged according to a definite pattern. The chemist to-day, in seeking to explain chemical action, has to realise that this takes place in many instances between aggregates of molecules, and at the surface of such aggregates and not between single simple molecules in solution such as his equations postulate and the ionic theory in its original form demands.

The first fact which has emerged from the detailed study of chemical action at a surface is that the action is not one of so-called first order in which the same fraction of the reacting substance undergoes changes in successive equal intervals of time—a change expressed graphically by a logarithmic curve. When proper and sufficient care is taken to keep the surface active the rate of change is uniform, provided that the changing substance is present at the surface in sufficient quantity. These facts are in accord with the hypothesis that action is preceded by the formation of an additive unstable complex which breaks down in all possible ways—that is, into a variety of components—practically as fast as it is formed. The problem of the source of the energy necessary to effect this is not without interest, but it is common to all chemical reactions, and its discussion may safely be left to the exponents of the quantum and other theories.

Such actions as we are considering are known as catalytic, the change being effected by virtue of the activity of the catalyst surface, the only other agent involved in practically all cases, both in the living cell and the test tube, being water. It is now recognised that the water molecule can undergo rupture in two ways, either being distributed upon a single molecule which is thereby resolved into two others—

$$A.O.B. + H.OH = A.OH + B.OH$$

or divided between two molecules in such manner that whilst the one is oxidised the other is reduced—

$$A + 2\,H.OH + B = AO + H_2O + BH_2$$

Entirely different classes of catalysts bring about the two actions, but all are classed as enzymes when concerned with changes which take place in the cell. Such enzymes as are well known are highly specific and selective, a different enzyme being required for each class of compound.

Armed with the knowledge of the fundamentals of chemical action in the cell, the time is ripe for the chemist to ascertain the inner meaning of phenomena which the biologist can only investigate by the recording of external visual characteristics. As a case in point the coloration of flowers and its inheritance may be cited. There is much in favour of the view that flower colours, whether anthocyans or belonging to other groups, are the product of the interaction of two factors, an oxidase and a colourless precursor of the pigment. The absence of either factor means failure to develop colour by the plant—*i.e.*, white flowers, and there may also be a third factor present which prevents action taking place between oxidase and leucobase.

If proper combination of effort between the biologist and chemist can be ensured, very many baffling problems, many of which are of far-reaching economic importance, can be attacked. As illustrating one such, in which that all-essential factor, quality, is concerned, the puzzling fact well known to agriculturists may be mentioned, that one pasture can fatten stock whereas another is of very little value for this purpose.

*Abstract of an address delivered to the South Wales Section of the Society of Chemical Industry by Dr. E. F. Armstrong, President of the Society.

Tariff Reform and Industry

To the Editor of The Chemical Age.

Sir,—It might be interesting to your readers to know that in the year 1909 an alteration was made to the then existing Patent and Designs Act, which was to the effect that articles patented in this country by foreign firms should be manufactured here.

We were very intimately connected with this matter, in being instrumental in fixing up foreign firms with factories, etc., to work here, and our records show the following approximate figures:—

1.	Value of land and premises acquired	£367,000
2.	Amount expended in buildings, housing workpeople, etc.	£532,500
3.	Amount expended on plant, machinery and equipment	£752,000
4.	Value of annual assessment on which rates were paid	£90,000
5.	Amount paid as rates per annum	£30,000
6.	Number of workpeople (male and female) employed, about	15,350
7.	Amount paid in wages per week, about	£17,600
8.	Number of foreign firms working	58
9.	Number of English firms manufacturing for foreign firms on royalty basis	35

It must be borne in mind that the above analysis does not in any way represent the total benefit that accrued to England under this Act. The figures supplied are those which came under our special notice through dealing with the firms who established themselves here. At that period there were many continental patent holders who did not build new factories, but nevertheless made arrangements for British manufacturers to have their patents produced here.

We venture to think that what the Patents Act did to increase employment in the manufacture of patented articles, Tariff Reform will do for employment in our national industries.

An interesting side-light on the present suggestions on Tariff Reform is before us as we write, by the applications received from continental firms for establishing factories in this country if an alteration is made in our fiscal policy. We are quite confident there would be a great many works opened up here, which would mean a very considerable amount of labour being employed, money expended on land and buildings, plant, and machinery, with its attendant advantages to the community in general.—We are, etc.,

Leopold Farmer and Sons,
Factory Specialists and Surveyors.

46, Gresham Street, E.C.2.

Personality in Business

"Personality in Business" was the subject of an address by Lord Leverhulme to the Liverpool Chemists' Association on Wednesday, November 7. He expressed his conviction that despite multiple shops and the unwise competition of cutting prices the trained and skilled pharmacist who put a strong personaltiy into his business and placed public service before pecuniary reward would ensure an increasing prosperity. If his customers considered the skill and care exercised in studying and meeting their wants, they would never complain of the charges of the pharmacist, who if he had looked only at monetary gain could have secured more lucrative results in other businesses. Thanks to the experience and skill in training the apprentices, pharmacy must become more and more a professional link between the public and the medical profession, for the pharmacist would often see far more of the patient than the doctor. Personality entered increasingly into the articles handled by the pharmacist which were being multiplied with the years. Proprietary articles offered to the pharmacist a springing-off board enabling him to extend his personality in the conduct of a business in which especially the part played by individuality was almost unlimited.

American Non-Ferrous Metallurgy

Some Impressions by Dr. Walter Rosenhain

DR. WALTER ROSENHAIN, F.R.S. (of the National Physical Laboratory, Teddington), in a lecture before the London Local Section of the Institute of Metals on Thursday, November 8, gave some of his impressions of American non-ferrous metallurgy gained during a recent visit. He was invited there primarily for the purpose of delivering a series of lectures. He was much impressed by the immense development of the non-ferrous industries and their remarkable organisation for mass production. Everywhere maximum output was regarded as the vital point, and labour-saving devices of every kind were employed to an extreme degree—a tendency partly due to a definite shortage of labour of any kind and a still more marked lack of highly-skilled labour.

Speaking of the general relation of science to the non-ferrous industries, the impression formed by Dr. Rosenhain was that these industries were very ready to avail themselves of scientific methods and appliances—more so than was the case here—but that, on the other hand, American looked to England for metallurgical research and did not contribute adequately to the advancement of the science. In this respect the American non-ferrous industry lagged seriously behind others, such as the great electrical and photographic companies, which had established research laboratories on a scale, both as regards equipment and staff, which was surprisingly large. He had noticed that at the American Brass Co.'s works, Hilger's spectrograph was used for spectroscopic analysis of metals and alloys by means of the ultra-violet spectrum, and this was being used with success at the Bureau of Standards, Washington. Perhaps the most important point in the use of the spectrograph was that, whereas in a chemical analysis one could only find, as a rule, an element by looking for it, the spectrograph would indicate the presence of elements which were not anticipated. It was very interesting to find such a highly scientific instrument in daily use in an American brass works. Grain size was another matter to which importance was attached, and a large number of specifications provided for determination of grain size by microscopic means. That was another example of readiness to apply scientific knowledge in a practical manner, which we did not always do here.

Our Leadership in Science

As regards real scientific research on metals, America was rather wanting, and there appeared to be a lack of leadership and initiative in these matters. There was no doubt that American metallurgy, ferrous and non-ferrous, looked for its scientific stimulus, information and guidance, to this country rather than to its own men of science, and it was admitted by Americans that this was an unfortunate and unsatisfactory state of affairs. We were looked upon to produce the knowledge, and we must admit that it was in America that that knowledge found its application mostly. At the same time, valuable scientific work on metallurgy was going on at the Bureau of Standards, and at other places, but it was a small item, having in view what America could do. The Bureau of Standards had paid us the compliment of adopting many of the the appliances and methods used in our own National Physical Laboratory. Although they had more money to spend than the National Physical Laboratory had, they did not spend much on the staff. Their salaries were deplorably low—rather lower even than those at Teddington, which were bad enough—(laughter)—and the consequence was a very large turnover in the staff of the Bureau. Soon after the war, whole divisions of that institution were entirely depleted of their staffs, because the rapid growth of industry had resulted in its absorption of the men, who could command higher salaries. It was difficult to get men from the colleges, because they were booked up two years before the end of their curriculum, which would be a highly refreshing state of affairs if it existed here. Yet the colleges were crowded. There was a very lively appreciation of the services which trained men could render to industry, and research suffered very seriously. The men who were engaged on research, however, were enthusiasts, who devoted themselves to the work from sheer love of it, but it damaged the status of their whole profession.

Dr. Roshenhain suggested that, while British non-ferrous industries had much to learn from America in regard to the application of scientific methods and results, labour-saving devices, and organisation for production on a very large scale, America, on the other hand, showed decidedly less regard for the last refinements of high-quality materials, and did not sufficiently encourage or provide for the wider aspects of metallurgical research even to the moderate extent to which this was being done at the present time in England.

Professor H. C. H. Carpenter, in proposing a vote of thanks to the lecturer, referred to the by-products recovered in the refining of copper; he believed selenium had certain scientific uses, but was not sure whether a use had yet been found for tellurium.

Dr. Rosenhain replied that he understood selenium had an important use, which absorbed the whole of the American output, namely, as a decoloriser in glass. For tellurium no use had been found, and he would be a bold man who tried to investigate it, because telluretted hydrogen was readily formed by the absorption of tellurium by the human system, and gave off objectionable odour, so that anybody who experimented with it would have to become a hermit.

Society of Public Analysts

AT the ordinary meeting of the Society, held at the Chemical Society's Rooms, Burlington House, London, on Wednesday, November 7, Mr. P. A. Ellis Richards, president, in the chair, a certificate was read for the first time in favour of Messrs. Robert Charles Frederick and Hubert Thomas Stanley Britton, M.Sc. (Lond.), F.I.C. Certificates were read for the second time in favour of Messrs. Laurence Eversley Campbell, M.Sc. (Lond.), F.I.C., John Troubridge Hannen, B.A. (Cantab.), A.R.C.Sc., A.I.C., Cyril Langley Hinton, F.I.C., Douglas William Kent-Jones, B.Sc. (Lond.), F.I.C., Thomas William Alan Shaw, M.Sc. (Liv.), William Hall Simmons, A.I.C., Kenneth Edward Nethercoate Williams and Percy Noel Williams, M.Sc. (Liv.), A.I.C.

Abstracts of Papers

In a paper on "The Gold-Beaters' Skin Test for Tannins," by Miss Phyllis H. Price, B.Sc., it was pointed out that tanning consisted in the fixation of the tannins by animal fibre. A reliable tannin test must therefore demonstrate this specific property, and such a test was described from Dr. Nierenstein's laboratory by Miss E. Atkinson and Miss E. O. Hazleton (*Biochem. Journ.*, 1922, 16, 516). Their method consisted of the fixing of the tannin on gold-beaters' skin and the subsequent staining of the skin with ferric chloride. Non-tannins were not fixed on the gold-beaters' skin and consequently not stained. The author had further developed the test and found that it was possible to detect 0·00005 grm. of gallotannin in 1 c.c. of solution with the use of either ferrous sulphate, ferrous chloride or amyl nitrite fumes in place of ferric chloride. It was also noticed that on decolorisation with dilute hydrochloric acid skins previously treated with pyrogallol tannins were completely decolorised, whereas those treated with catechol tannins had a reddish stain left on them. This was suggested as a test for phlobaphenes.

Mr. W. Donovan, M.Sc., who presented a paper on "Determination of Nitrogen in Coal," confirmed the work of Fieldner and Taylor, Terres, Fleischer, and others, who observed that the Dumas process as described in the report of Research Committee of the Institute of Gas Engineers, and the Kjeldahl both gave results below truth, the former owing to incomplete combustion, the latter by loss of gaseous nitrogen, but pointed out that the Dumas process made no provision for the complete removal of hydrocarbons. Concordant results were, however, obtained with the Dumas process (hydrocarbons having been completely removed) by the addition of a constant 0·2 per cent. to the Kjeldahl figure, using mercury as a catalyst.

"The Estimation of Lead in Potable Waters" was dealt with in a paper by Mr. John C. Thresh, M.D., D.Sc., F.I.C. In estimating traces of lead in coloured moorland waters the influence of the colour, it was pointed out, was not always removed by making the standards with the same water diluted with distilled water. The presence of even one part of copper in 100 millions reduced the depth of the tint given by lead, and iron in solution also interfered with the colorimetric estimation of lead and accounted for most of the discrepancies obtained with moorland waters. It was essential that the standard should have the same acidity and contain the same acid as the water under examination.

The Problem of Corrosion

Paper by Dr. U. R. Evans

At the monthly meeting of the Oil and Colour Chemists' Association on Thursday, November 8, Dr. U. R. Evans, of Cambridge, gave a lecture on "Corrosion." Dr. J. Newton Friend (President) was in the chair.

Dr. Evans said that although the types of corrosion generally met with involved the presence of both oxygen and water there were some important exceptions. It was known, for instance, that at high temperatures metals would oxidise in dry air, but even at very high temperatures the amount of oxidation was very small, and recent calculations of the time necessary to produce a film of visible thickness under these conditions showed that the period was an exceedingly long one. In the case of lead, the shortest possible time was 90 years, while zinc, copper, and iron took immensely longer. For practical purposes they could neglect altogether the oxidation which was produced in metals at ordinary temperatures in dry air. When moisture was present, however, the oxidation went on quite quickly. Another important exception was the cases in which oxygen was not needed for corrosion, and that condition was produced in the presence of an acid solution. With neutral or nearly neutral solutions oxygen was necessary for oxidation to proceed.

Dr. Evans described a number of simple experiments which, he said, gave the key to the mechanism of corrosion of this type. These experiments were on the lines of the usual electro-chemical theory of corrosion where oxygen and water are present. The manner in which localised electro-chemical action took place on the surface of metals under these conditions was shown and the danger of it from the practical point of view emphasised. It was also shown how the presence of rust on metals tended to promote further corrosion, and the phenomenon of rusting occurring in places to which oxygen had had least access was touched upon. Moreover, attention was drawn to the fact that rusting often took place in inaccessible places not protected by the protective covering.

Paint the Most Satisfactory Preventive

The last point led up to the aspect of the problem of preventing corrosion involved in the necessity for completely covering the surface to be protected; and as regards this protection of more or less inaccessible parts, he said that protection by means of paints was more effective than that of protecting by a covering of another metal. Although it was perfectly feasible to cover a surface completely by immersing it in tin, for instance, or by electro-plating it, it was obvious that a substance which was more or less plastic and viscous at the time of application, such as paints, was more likely to cover up scratches, etc., where local corrosion so often took place, than would a material such as electro-plating which solidified immediately after application. Another point in favour of paints was that, even though the whole surface was not absolutely covered, if the paint was a good insulator not much harm would come, as the manner of covering, although leaving a minute spot uncovered, would prevent the formation of an electrical couple and thus prevent corrosion. He had found, during the course of his experiments, that hydrogen chloride was the most fatal as a corroding agent to zinc and aluminium; ammonia was the most fatal to copper and copper alloys, and sulphur dioxide was the most fatal to iron and nickel.

In the case of metallic coatings, however, if the surface of the coating was interrupted by a dust particle on the metal being covered or by a crack or scratch, there was at once the liability of the setting up of electro-chemical action due to the presence of two dissimilar metals. According to the nature of the metals used in this way, it might be the protecting metal which was attacked by the electro-chemical action or it might be the metal which it was hoped to protect. For this reason he did not think the use of coating metals nearly so effective as was sometimes imagined for protecting steel. There had been cases in which the whole of the zinc covering had disappeared and left the steel exposed. If, on the other hand, the coating metal was tin, nickel, lead or copper, it was the iron which would be preferentially attacked. For some purposes, such as food containers, it was better that the iron should be attacked than the poisonous tin coating. For these reasons, therefore, it seemed to him rather doubtful whether the use of coating metals was, in some cases at any rate, as beneficial as was sometimes thought.

In dealing with coverings of metals by paints to prevent corrosion, Dr. Evans expressed the opinion that mechanical reasons rather than chemical considerations must be regarded as of first importance. Their President had previously pointed out in regard to paints that the first function of the pigment—other than decorative—was to act as a support for the vehicle, to add mechanical strength and mechanical suitability to the film for the purposes for which it was applied. In certain cases, however, the pigment had a very specific effect on the course of the corrosion. Cushman and Gardner and other workers had shown that a carbonaceous pigment tended to promote rust, whilst certain basic pigments and chromate pigments tended to keep the iron passive. The action of carbonaceous pigments was generally ascribed to the fact that they set up electro-chemical action where they came in contact with the iron, and although, with a few exceptions, that was rather an exaggeration, electro-chemical action might be set up in that way.

One other method of preventing corrosion which was a rival to painting was the use of the corrosion-resisting alloys and materials which were supposed, in many cases, to require no paint. He did not suggest, however, that metal protection by a coating of another metal would displace painting altogether.

Chemical Industry Club Annual Meeting

Sir William Pope the First President

The annual meeting of the Chemical Industry Club, London, was held on the Club premises on Monday evening. Mr. A. G. Craig, chairman of the executive committee, presided. The annual report (noticed last week) and the financial statement (showing a balance of £45 8s. 3d. to be carried forward after transferring £54 12s. to reserve account in respect of entrance fees) were adopted.

The Chairman said that in the opinion of the committee the time had come to nominate a president of the Club, and he had great pleasure in moving the election of Sir William Pope, who had consented to act if it were the wish of the members. The resolution, which was seconded by Professor H. E. Armstrong, was unanimously passed. On the motion of the Chairman, seconded by Dr. Dehn, Dr. Hodgkinson, the first chairman of the executive committee, was elected the first vice-president.

Dr. Ormandy stated that Captain Goodwin, who had acted for several years as treasurer of the Club, found it impossible to continue on account of other duties, and while expressing their hearty thanks to him for his services he had pleasure in proposing Mr. J. Miller-Jones as his successor. The motion was carried unanimously, and the new treasurer in responding remarked that it was satisfactory to start with the finances in a sound state owing to the spade work done in the past.

Reference was made to the retirement of Mr. Coley from the honorary secretaryship of the Club, and to a presentation which is to be made to him at the annual dinner. Dr. Ormandy said that although they had secured an excellent secretary in Mr. Arthur Williams, there was a feeling in favour of retaining the office of honorary secretary, and on his motion, seconded by Mr. Pilcher, Dr. E. H. Tripp was elected. Dr. Tripp, in acknowledging his election, emphasised the democratic character of the Club. "We kow-tow to nobody," he said, "but we welcome all into the fold. We acknowledge no external authority, and steer clear of being influenced by any clique, sect, or society which seeks to use the Club for its own purposes. We cannot do better than follow the lines already laid down, and continue to maintain the complete independence, freedom, and dignity of the Club."

Votes of thanks were passed to Mr. Coley and Captain Goodwin, as well as to Mr. Craig, who retires from the chair after two years' service, and the three retiring officials were elected to fill vacancies on the committee. Messrs. Hughes and Allen were re-elected auditors.

The speakers at the annual dinner, to be held in the Connaught Rooms on Monday, November 26th, will include Sir Lionel Phillips, Sir Arthur Duckham, Mr. F. W. Harbord, and probably Sir John Cadman. A large gathering is already assured.

Absorption Towers and Filters

Papers before the Institution of Chemical Engineers

At a meeting of the Institution of Chemical Engineers on Wednesday, Sir Arthur Duckham being in the chair, two papers were read by Mr. M. B. Donald describing work done in connection with absorption towers and filters. Considerable interest was raised by them, and a short discussion of the points in the papers followed each one, facts being quoted by various speakers in support of the author's conclusions.

In the first paper, which was a record of work done by Messrs. M. B. Donald and C. W. Tyson, entitled " A Study of Absorption Towers," after reviewing the present knowledge of the problem, the conclusion was reached that the question of gas velocity required investigation. Some experimental data was then given, which had been determined in order to discover some facts concerning the effect of gas velocity. The tower used was made entirely of lead, with flanged top and bottom, which could be bolted down when the tower had been packed. The SO_2 concentration of inlet and exit gases was determined by an Orsat, and the exit liquor concentration by titration with standard iodine in potassium iodide. The vapour pressure of SO_2 over solutions of sulphurous acid was determined from the data given by T. H. Sims, and the partial pressure of the SO_2 in the gas from the barometric pressure and its concentrations, as determined in the Orsat. The dry SO_2 gas, containing about 8 per cent. SO_2 was tapped off the main gas line, where it was under pressure, and measured by a $\frac{5}{8}$ in. orifice in a 2 in. pipe. The static pressure and temperature were measured after the orifice. The gas was then passed through a $\frac{1}{2}$ in. lead coil in a barrel of water, so that it could be brought to a constant temperature. The temperature, pressure and analysis were taken about a foot from the inlet into the tower. The water rate was kept constant at 45 c.c./min. when ring spray was used, and increased to 85 c.c./min. for the spiral spray. It was fed into a 50 litre bottle from the public water supply at the same rate at which it flowed from the spray. The total head of water above the spray was 10 ft. 6 in., and the amount sprayed was controlled by adjusting a screw clamp near the tower. The spray was pierced with small holes so that the water was sprayed horizontally against the walls of the tower. The rate was adjusted so that the walls had a continuous stream of water flowing down them, and it was found that by spraying the water on to a strip of paper instead of the bare lead a much better distribution was obtained.

Variation of Velocity and Temperature

The values obtained by varying the velocity and temperature, as well as the effect of varying the temperature and keeping the gas velocity constant, were shown diagrammatically. The velocity was expressed relative to the tower, as it was almost impossible to get more than a rough estimation of the velocity of the gas relative to the liquor. In order to decrease the effective area of the tower and thus give a greater relative velocity between the gas and liquid, a closed cylinder 27 in. high and 6 in. diameter, provided with four 2 in. legs, was lowered into the tower and secured so that it was exactly in the centre. The slope of the curve obtained was very much less than that for those of lower velocities. This indicated that increase in velocity of the gas increased the rate of solution up to a point where one obtained a maximum effect.

The ring spray was then replaced by a similar piece of lead pipe made into a spiral with the inside end joined on to the inlet pipe, as before, in order to ensure a fairly uniform delivery through all the holes. Although the wetted surface by the spray method was smaller than that obtained by allowing the water to flow down the sides of the tower, yet it gave a very much better co-efficient, probably due to the fact that the gas produced a greater effect by impinging on a surface instead of merely brushing past it. The tower was packed with eight layers of four spiral brick tiles each, staggered so that the gas could not get through them. Three lead discs were used as baffles at various points in the centre of the tower, which space would otherwise have been an unrestricted channel for the gas. When the tiles were taken out of the tower they were found to be wet all over, indicating efficient distribution by the spiral spray. The wetted area in this case was 14·2 sq. ft., and the free volume in the tower ·546 cu. ft. As to the coke packing, the tower was filled for 26 in. with 21 lb. of 1 in. diameter coke, which had been previously used in towers for drying the sulphur dioxide, and was fairly carefully graded. The coke was well washed with water, and left in an atmosphere of SO_2 overnight before the runs were made. This gave a wetted area of 39·6 sq. ft. and a free volume of ·329 cu. ft.

Summary of Results

The results for the spiral tiles and the coke were shown diagrammatically, the velocity of the gas relative to the tower being determined from the ration of " free " volume to total volume. The curves obtained confirm some previous results by M. S. Salomon and W. S. Brackett, who worked on a similar tower filled with 3-in. tiles, and with a concentration of SO_2 in the gas about 18 per cent., and showed that the velocity of the gas produced a maximum effect at about 12 ft. per second. The effect of velocity of a gas giving a maximum value when impinging on a surface appeared to be analogous to the operation of a sling psychrometer, where, in order to get the wet bulb temperature of the air, the rate of evaporation of water from the wet bulb was kept constant by rotating the thermometer through the air above a certain definite speed.

Filtration Problems

The second paper, by Messrs. M. B. Donald and R. D. Hunneman on " A Study of the Conditions of Constant Rate of Flow in Filter Presses," described work done on some Sweetland filter presses at a sugar refinery where the sugar and syrup liquors were sent to " blow-ups " or defecators, to be brought to the correct degree of blueness (litmus paper) by adding either lime or acid calcium phosphate. This brought down the calcium phosphate, albuminous and gummy materials which had to be filtered off. The sugar liquors received fresh kieselguhr as a filter aid, but the syrups use reclaimed sludge—which consists of used kieselguhr from the sugar presses—from a sludge settling tank. In order to obtain data, one leaf, on which the cloth was fairly new, was chosen instead of the whole filter press of 72 leaves, and apparatus was arranged to determine the pressure and rate of flow, keeping the latter constant.

The form of curve obtained for the constant rate should give a straight line according to theory, which they by no means did, and at first hand tended to show that the formula of Lewis would not apply to constant rate filtration. This formula, however, was designed to disregard press resistance, and therefore the press resistance of the initial precoat of filter-aid deposited by the sugar solution must be considerable. The paper showed, however, that press resistance must be taken into account, that it could be considerably raised by pumping more or less clear liquor through it, and that it could be modified by giving it a precoat of kieselguhr. These facts, it was stated, indicated that more attention should be paid in investigations to the initial clogging up of the filter cloth pores by the precipitate. One of the chief objects of dealing with the problem of filtration in the manner indicated in the paper was to obtain a table of values for the specific resistance for all kinds of materials and also to ascertain in what way various changes in operation and in method of preparation can affect its value. In this way, it should be possible to design a filter press from a known constant of the substance to be filtered.

Science and Civilisation

Sir Richard Gregory, editor of *Nature*, delivered an address on " Science and Civilisation " at a meeting of the Liverpool University Chemical Society on Thursday, November 8. If the Greeks, he said, had carried out experiments on the lines of modern science the world would have been 2,000 years in advance of its present position. The spirit dominating Greek science was like that of the modern literary people who dealt only in words, and considered themselves as living on a higher plane than those engaged in modern science. Reproaches were often levelled against science for the base uses to which its discoveries were put, but the fact was that science was in advance of civilisation. Progress, intellectural or otherwise, could not be prevented, and if the human race was not ready to receive the gifts of science the responsibility lay with the statesmen, the teachers, and the community as a whole. What had to be done was to advance moral and ethical ideas to higher planes, so that new knowledge should benefit the human race instead of being used to destroy it. Unless that was done there would be an end of civilisation; for it was possible to conceive of a time when the forces at man's disposal would be so strong that a hostile army and an enemy's city might be destroyed almost by the touch of a button.

Chemical Trade in October

THE total value of chemicals, dyes, drugs and colours imported into Great Britain in October was £1,245,916, an increase over last year of £279,704, and an increase on the figure for September of this year of £222,364. There was also a marked increase in the value of exports, the value of the goods exported under the same heading being £2,572,881, an increase of £982,594 on October of last year, and £231,120 on September of this year.

An examination of the figures as to the quantities of different chemicals dealt with, which are given below, shows marked increases in imports of nitrates, alizarine dyes, coal tar intermediates, synthetic indigo, barytes and essential oils compared with last year. On the export side the increases occur particularly with sulphuric acid, sulphate of ammonia, potash salts, the whole range of coal tar products, coal tar dyes, and many other items. The decreases in exports are very few, sodium sulphate being the only item with any important diminution :—

Imports for October

INCREASES.		1923.	1922.
Calcium carbide	cwt.	87,509	77,769
Distilled glycerin	,,	311	236
Nickel oxide	,,	6,656	—
Potassium nitrate	,,	12,352	3,640
Sodium nitrate	,,	109,142	63,570
Other sodium compounds	,,	24,462	18,939
Cream of tartar	,,	2,871	2,454
Intermediate coal tar products, including aniline oil, and salt, and phenyl glycine	,,	198	7
Alizarine dyestuffs	,,	1,062	560
Synthetic indigo	,,	190	7
Unspecified coal tar dyestuffs	,,	3,854	3,249
Barytes (including blanc fixe)	,,	49,135	25,109
White lead	,,	10,561	10,044
Unspecified painters' colours	,,	66,598	42,013
Essential oils, other than turpentine	lb.	442,010	265,173
Turpentine	,,	100,686	64,096
DECREASES.			
Acid, acetic	tons	537	695
Acid tartaric, including tartrates	cwt.	60	1,335
Bleaching materials	,,	2,285	2,775
Borax	,,	2,555	5,621
Crude glycerin	,,	3,213	5,225
Red lead and orange lead	,,	2,577	3,707
Potassium compounds, except nitrate	,,	325,474	608,513
Zinc oxide	tons	451	557
Natural indigo	cwt.	—	78
Mercury	lb.	179,779	367,049

Exports for October

INCREASES		1923.	1922.
Acid sulphuric	cwt.	2,707	898
Acid tartaric, including tartrates	,,	2,422	1,277
Ammonium sulphate	tons	26,587	9,659
Bleaching powder	cwt.	31,918	22,325
Anthracene	,,	3,960	—
Benzol and toluol	,,	424,599	5,906
Carbolic acid	,,	15,694	13,454
Naphtha	,,	29,456	2,486
Naphthalene	,,	21,314	4,908
Tar oil, creosote, etc.	,,	7,250,372	500,655
Unspecified coal tar products	,,	38,061	18,342
Crude glycerin	,,	9,643	120
Distilled glycerin	,,	9,653	8,216
Potassium chromate and bichromate	,,	3,815	1,801
Potassium nitrate (saltpetre)	,,	1,735	1,373
Other potassium compounds	,,	3,810	2,911
Caustic soda	,,	145,967	113,608
Sodium chromate and bichromate	,,	5,190	1,785
Zinc oxide	tons	240	172
Coal tar dyestuffs	cwt.	16,224	4,237
Unspecified dyestuffs	,,	4,819	4,799
Barytes (including blanc fixe)	,,	8,148	5,322
White lead	,,	15,988	15,019
Paints, etc., ground in oil or water	,,	31,909	20,272
Paints, etc., prepared	,,	36,089	19,544
Paints, etc., unspecified	,,	63,582	41,523
DECREASES.			
Ammonium chloride	cwt.	266	450
Copper sulphate	,,	340	842
Sodium carbonate, etc.	,,	375,804	381,299
Sodium sulphate, including saltcake	,,	187,031	264,772
Unspecified sodium compounds	,,	42,132	44,746

Gasworks Residuals: A Poor Outlook

Evidence by Mr. Milne Watson

MR. D. MILNE WATSON, the Governor of the Gas Light and Coke Co., giving evidence on Wednesday before the Director of Gas Administration (Mr. H. C. Honey) during an inquiry into an application by the London County Council for a reduction of the standard price under the sliding scale of the Gas Light and Coke Co., spoke of the poor outlook in the immediate future for gasworks residuals.

Speaking with regard to coke, he said that during recent times the company has exported a much larger quantity of its coke than was usually the case and very good prices had been obtained, up to as much as 40s. per ton. The reason why the export price of gas coke had been so good in the past was that Germany, which used to export furnace coke, became a buyer of English furnace coke. That had the effect of putting up the price, with the result that Sweden, which used to be a buyer of English furnace coke, could not afford to buy it any longer and bought gas coke instead. That had the effect of putting up the price of gas coke. At the present time, however, Germany is not buying English furnace coke, which in consequence was again finding a market in Sweden. This had had an effect upon the price, which during the past two or three weeks had fallen to 33s. per ton, and that was dragging the price of gas coke down with it. As a matter of fact, his manager had told him that morning that there were no buyers for English gas coke abroad. That meant that the bottom was out of the market for the moment, and he anticipated that the price of gas coke was likely to drop 10s. a ton before the end of the year. Incidentally, Mr. Milne Watson mentioned that 1920 was an extraordinary year, in as much as £11 per ton was obtained for coke for export. Within a few months, however, the price had fallen to £4 a ton.

With regard to breeze, it was stated that prices are also falling, owing to the competition of slack coal. Again, in connection with tar, there were signs of a break during the past year, and he had sold at as high a figure as 190s. per ton in the first half of 1923, but the price was now down to 130s. per ton.

Continuing, Mr. Milne Watson said that, as chairman of the Sulphate of Ammonia Federation, he was only too sadly aware that prices for sulphate of ammonia are on the down grade, and he estimated that the price would be round about £13 per ton by the end of the year. He added that he did not see anything in the sulphate market to give much hope. There had been a great increase in production all over the world, and the Germans had come into the export market with quite large quantities, with the natural result that prices had broken all over the world.

It may be said that all this was with a view to suggesting that the reduced standard price which the London County Council had placed before the Director of Gas Administration is too low, and that an intermediate figure between that and the existing one would be fair. That particular aspect, however, has not much interest of a technical nature for our readers and need not be gone into in further detail.

Determining Gases in Metal

ANALYSES for oxygen, hydrogen and nitrogen have recently cbeen ompleted by the U.S. Bureau of Standards on samples of hard white iron and malleable iron from two plants melting in electric furnaces and from these plants melting in air furnaces. In all cases it was found that the annealing of the hard iron increased the oxygen content of the metal and decreased the nitride nitrogen content. No distinction between air furnace and electric furnace iron was found on the basis of the oxygen content or on the basis of the changes in oxygen or nitrogen. There was apparently in some instances a tendency for electric furnace iron to contain more nitrogen than air furnace iron in both hard and annealed conditions, but this difference was not true throughout the series of samples analysed. The ranges of gas contents were as follows: Oxygen in hard iron, 0·0014 to 0·0043; oxygen in malleable iron, 0·0060 to 0·0190; nitrogen in hard iron, 0·0080 to 0·0104; nitrogen in malleable iron, 0·0011 to 0·0036.

Research on Colour Intermediates

Papers by Professor Morgan and Others

THE first meeting of the session, of the Birmingham and Midland Section of the Society of Chemical Industry, in association with the Chemical Society was held on Tuesday, November 6, at the University. The papers were by Professor Morgan, head of the Chemistry Department, in conjunction with colleagues and students, and dealt with research work at the Birmingham University.

Dr. Parker presided in the absence of Dr. E. B. Maxted (chairman). He pointed out that an innovation had been agreed upon by the Section whereby chemistry students interested in the work of the Society were now entitled to attend the meetings by becoming associated. There was no entrance fee, and the subscription had been fixed at 2s. 6d. for this year; thus associate students would be able to attend the meetings, but they would not be entitled to vote at the annual general meeting or to receive the Society's publications. The chairman also announced that on December 15 a dinner would be held by the Midland Section of the Society of Chemical Industry in conjunction with the Institute of Chemistry at the Queen's Hotel, Birmingham. A large and representative attendance was expected.

Aminoacetophenones as Colour Intermediates

Professor G. T. Morgan and Mr. J. E. Moss in a paper on this subject pointed out that the nitration of acetophenone (hypnone) affords a suggestive illustration of the application of the Crum Brown and Gibson rule of substitution in the benzene series. The acetyl group present in acetophenone has as its hydride, acetaldehyde, a substance capable of direct oxidation to acetic acid. Accordingly the acetyl group should favour meta substitution. At low temperatures nitration led to *meta* nitroacetophenone as the preponderant product, *ortho* nitroacetophenone being present as a by-product, the proportion of the latter increasing with rise of temperature. But even at the highest temperatures at which nitration occurs smoothly meta substitution predominates, although owing to oxidation a portion of the product now appears as *meta*-nitro benzoic acid.

The two nitroacetophenones when reduced gave the corresponding amino-derivatives which were tested as dye-producing intermediates. When diazotised and coupled with β-naptholsulphonic acids the aminoacetophenones furnished monoazo-dyes. Mordanting tests showed that azo-dyes from *ortho*-aminoacetophenone did not behave as adjective colouring matters towards chromic and copper salts in spite of the contiguity of the carbonyl group to the hydroxy-radicle. When, however, the acetyl group is replaced by carboxyl as in anthranilic acid, well marked mordanting effects are obtained.

The negative result obtained with acetophenoneazo-β-naphthol dyes as regards mordanting throws considerable doubt on the validity of the hydrozyazo-constitution of these colouring matters and affords support to the view that azo-β-napthol dyes are really hydrazones of β-naphthoquinone-sulphonic acids. Moreover, this hypothesis furnishes a ready explanation of the mordanting effects obtained with the anthranilic acid azo-dyes which contain a lake forming carboxyl radicle in close proximity to quinonoid oxygen.

Bactericidal Action of The Tellurium Derivatives of Aliphatic β-Diketones

The paper on this subject, of which an abstract is given below, was by Professor G. T. Morgan, Mr. E. A. Cooper and Mr. A. W. Burtt :—

The tellurium β-diketones described in the preceding papers have been examined on micro-organisms with the following results :—

1. Tellurium dipropionylmethane is the most active of the series being bactericidal as regards *Bacillus Typhosus* in concentrations of the order of one in 40 millions.

2. The bactericidal power of these tellurium derivatives increases with the ascent of the homologous series of β-diketones.

3. Position isomerism plays an important part in determining bactericidal power, the orientation of alkyl groups affecting considerably the activity of the tellurium compound.

4. These tellurium compounds lose their strong bactericidal action in the presence of serum, but they retain their inhibitory power. Their germicidal action is, however, maintained in urine.

5. The tellurium derivatives are very toxic to mice, causing hematuria. Differences in toxity correspond with variations in bactericidal power.

6. These compounds, and especially tellurium dipropionylmethane and tellurium 3-methylpropionylacetone, offer promise of application as disinfectants in treatment of infective conditions of the urinary organs.

The Interaction of Tellurium Tetrachloride and The Higher β-Diketones: Parts I, II, and III

Professor G. T. Morgan, and Messrs. H. D. K. Drew, R. W. Thomasom and E. Holmes, in a paper on this subject stated that although in the great majority of instances the metallic and metalloidal derivatives of acetylacetone contain the organic group in the form of a univalent radicle, nevertheless in combination with selenium and tellurium, the above mentioned β-diketone furnishes bivalent radicles. The dichlorotellurium derivative containing a bivalent radicle is readily reduced to tellurium acetylacetone, a bright yellow substance soluble in water and having outstanding germicidal properties.

On account of its singular chemical constitution and because of the bactericidal powers of tellurium acetylacetone, the condensation with tellurium tetrachloride has been extended to the homologues of acetylacetone.

β-Diketones containing normal branched chains give rise to dichlorotellurium derivatives of the bivalent organic radicles. β-Diketones containing alkyl substituents in the methylene group also yield these comparatively stable dichlorotellurium derivatives readily reducible to the active tellurium β-diketones. With branched chain β-diketones, the tellurium tetrachloride condensation takes a different course, and the unstable tellurium derivatives contain only univalent radicles. The complex ketones diacetylacetone and dimethyldihydroresorcinol give rise to oxonium tellurichlorides. Ethyl acetoacetate gives rise only to an unstable tellurium derivative of a univalent radicle.

These experiments conducted over a wide range of β-diketones have thrown light on the chemical behaviour of these reactive substances and have furnished a new group of tellurium derivatives having pronounced bactericidal and physiological action.

The Rearrangement of the Science Museum

THE science collections of the Science Museum, which have been exhibited in the galleries on the north side of Exhibition Road, London, for many years past, have now been transferred to the new Museum building, in order that those galleries may be prepared for the Imperial War Museum, which is shortly leaving the Crystal Palace. The greater part of the science collections has been placed in store until the new galleries now under construction are ready, but selected groups from them are now being exhibited in a gallery on the first floor of the Museum. Here will be shown the greater part of the Meteorology Collection, including a copy of an early raingauge from Korea; and in astronomy some astrolabes, quadrants, telescopes and sundials. In surveying, the levels and theodolites are exhibited with types of survey mark; in optical instruments, microscopes, field-glasses, and spectacles are represented, as well as a part of the collection illustrating moving pictures. In chemistry, several exhibits of historical interest are shown, as well as models of chemical works.

Retirement of Professor Henry Louis

OLD students of Armstrong College, Newcastle, entertained to dinner on Friday, November 10, Professor Henry Louis, M.A., D.Sc., on the occasion of his retirement from the Chair of Mining. Professor Louis has held the Chair from 1895 until the present year, and, during that period over 1,000 students have been under his tuition. He remains in Newcastle after his retirement, and will be engaged in consulting work. Sir Theodore Morrison presided over the dinner, which was held in the College, and was attended by a number of influential mining engineers, who were formerly students under Professor Louis. The toast of Professor Louis's health was given by Mr. F. H. Wynne, H.M. Inspector of Mines. It was announced that a presentation of Professor Louis's portrait, painted by Mr. Ralph Bullock, is to be made on a future occasion, the date to be announced later.

The Van der Waals Memorial Lecture

Dr. J. H. Jeans on its Modern Interpretation

In the course of the van der Waals Memorial Lecture before the Chemical Society on Thursday, November 8, Dr. J. H. Jeans discussed the work of van der Waals in relation to the molecular theory. He said that van der Waals' equation, $(p + a/v^2)(v - b) = \alpha T$ expresses the result of supposing a molecule to be endowed with two distinct physical properties—finite size, giving rise to the term b, and cohesive force, giving rise to the term a/v^2. The physical meaning of the equation is best exhibited by drawing diagrams of isothermals of the familiar type. Representing different gases, there will be different diagrams corresponding to different values of a and b. It is, however, readily shown that one diagram of this type can be made to represent all values of a and b, and so the isothermals of all gases, by suitable expansions and contractions of its horizontal and vertical scales. On removing the scale from any single diagram, we have a universal diagram which represents the p, v, T relation for all gases, but without specifying the scale. The circumstance that such a diagram is possible is equivalent to the so-called "Law of Corresponding States." This is now seen to be a mathematical consequence of van der Waals having confined himself to a two-constant specification of molecular structure.

Supposed Universal Attraction

Van der Waals explained his cohesive power by the supposition that all matter possesses inherent powers of attraction for all other matter. Gravitational attraction is numerically far too small to come into the question at all, so that it is to the electrical structure of matter that we must look for the origin of this supposed universal attraction. If molecules were electrically charged structures, similar molecules would repel one another; as they are electrically neutral they will repel in some orientations and attract in others, but two molecules meeting at random are as likely to repel as to attract. It is only when we study the duration of molecular encounters that we find an explanation of the preponderance of attraction over repulsion—attractive encounters draw the molecules further and further into each other's sphere of influence, and so last longer than repulsive encounters. There is thus a resultant attractive force. This attractive force, however, originates far more in an abstruse theorem of statistical mechanics, and far less in an inherent property of matter, than van der Waals supposed. If this interpretation is right, the cohesive forces must disappear at very high temperatures and must steadily increase with decreasing temperatures, so that a must be a function of the temperature and not, as van der Waals supposed, a constant. In point of fact, all attempts to bring van der Waals' equation into closer agreement with observation begin by making a a function of the temperature. Moreover, a is found to vanish at infinite temperatures in conformity with the suggested explanation.

Fetters We Do Not Understand

The second constant b was supposed by van der Waals to have its origon in the finite sizes of the molecules. If, for instance, the hydrogen molecule is regarded as a sphere, its radius as calculated from the observed value of b is found to be $0{\cdot}64 \times 10^{-8}$ cms. The same radius can be calculated independently in other ways; the average of these, $0{\cdot}66 \times 10^{-8}$ cms, would give for the hydrogen atom a volume equal to that of a sphere of radius $0{\cdot}53 \times 10^{-8}$ cms. But the normal hydrogen atom, as we now know from the researches of Bohr, consist of two electric charges, describing a circular orbit, one about the other, of radius precisely equal to $0{\cdot}53 \times 10^{-8}$ cms. As regards collisions with other molecules, this invertebrate structure consisting of two point-charges with no material connection between them appears to reserve for itself a three-dimensional spherical volume with as much precision as though it were a sphere of infinite hardness. The explanation of this infinite hardness is to be found in the intangible fetters of the quantum dynamics. The nature of these fetters we do not in the least understand, but we believe that they are such that no force in creation can cause the electron of the hydrogen atom to describe a smaller orbit than the normal orbit of radius $0{\cdot}53 \times 10^{-8}$ cms. If we further suppose that this orbit is free to assume all orientations in space we at once understand why it is legitimate, for kinetic theory purposes, to treat the hydrogen atom as an infinitely hard sphere of radius $0{\cdot}53 \times 10^{-8}$ cms. The quantum theory brings us back, in a sense, to the infinitely hard spherical atoms of Lucretius, and the radius of these spherical atoms can now be calculated with precision from the quantum theory; their infinite hardness is beautifully exemplified in the experiments of Franck and Hertz.

We thus see that the a and b of van der Waals admit of exact interpretation in terms of the physical conception of to-day. His b arises from what we may call the quantum forces—the perfectly unyielding restraints which bind the electrons of an atom down to definite orbits—while his a arises from the ordinary electric field of force.

The Faraday Society

Work on Hydrogen Peroxide and on Colloids

Among the papers presented at the meeting of the Faraday Society in London on Monday, Dr. Leonard Anderson read one on "The Effect of Sucrose on the Rate of Coagulation of a Colloid by an Electrolyte," and Dr. J. B. Firth and Mr. F. S. Watson dealt with "The Catalytic Decomposition of Hydrogen Peroxide Solution by Blood Charcoal."

Dr. Anderson described how the coagulation of gold sols by hydrochloric acid, barium chloride and potassium chloride in presence of varying amounts of sucrose at 25° C. was investigated. He concluded that sucrose exercised a definite peptising effect upon colloidal gel. He also concluded that sucrose exerted a specific augmentation of coagulation in the case of hydrogen and barium ions over and above that of increasing the activity of these two ions. It was evident that sucrose was by no means inert towards ions and gold sols. It exhibited apparent antagonistic action. The experiments indicated in general, however, that the coagulating power of an ion was dependent upon its activity rather than upon its concentration, a conclusion which brought the typical colloid phenomenon of coagulation into line with the kinetics of chemical change in homogenous (molecular) systems.

The paper by Dr. Firth and Mr. F. S. Watson described how they had established that ordinary blood charcoal previously heated to 120° C. showed moderate catalytic activity in the decomposition of hydrogen peroxide solution. The catalytic activity of blood charcoal was considerably increased by previous heating in a vacuum at 600° C. and 900° C., and was still further increased by previous sorption of iodine from solution and from which the iodine had been subsequently completely removed.

The activity of an activated charcoal consisted of two types—one which was termed α activity was very rapid, but ceased after a few minutes, and a second termed β activity, which might persist for several hours. Both types might be increased by activation methods. In ordinary blood charcoal activity was absent. The introduction of iron into sugar solution prior to carbonisation considerably increased the activity of the charcoal by an amount greater than could be accounted for by the iron alone, and it was suggested that the iron acted as a spacing agent, thereby increasing the activity of the carbon itself.

Volumetric Estimation of Auramine

According to Mr. W. C. Holmes, of the American Chemical Society, the sodium salt of indigotin disulphonic acid is considered to be the most suitable precipitating agent for Auramine, and the interaction should be of considerable service in the valuation of commercial brands of this dyestuff, since the presence of the ordinary impurities, such as dextrin, common salt, Glauber's salt, etc., does not appear to influence the results. The Auramine solution containing, in general, 0·2 per cent. of dyestuff, is stirred continually during the addition of a 1 per cent. stock indigotin sodium disulphonate solution. The mixture is spotted on Whatman filter paper from time to time until a perceptible blue tint appears in the diffusion zone surrounding the spot. This is accepted as the end-point.

Explosion at a Chemical Works

Award of £2,000 with Costs

In the Official Referee's Court, London, the action, Belvedere Fish Guano Co., Ltd., *v.* Rainham Chemical Works, after a hearing which occupied four days, was concluded on Thursday, November 8, when judgment was given for the plaintiffs for £2,000. The claim made by the Belvedere Fish Guano Co. was for damages in respect of injury to their building, plant and machinery by an explosion at the plaintiffs' works in 1916. The plaintiffs were manufacturers of fish guano on land adjoining the Rainham Chemical Works, where, in 1916, under a contract with the Government, the manufacture of picric acid from dinitrophenol and other explosives was carried on, and a serious explosion occurred destroying the plaintiffs' property and causing the loss of seven lives. The plaintiffs brought an action for damages in the King's Bench Division in 1917, when Mr. Justice Scrutton found in their favour. The defendants went to the Court of Appeal, which confirmed the judgment of the Court below. They then went to the House of Lords with a similar result, and the matter was referred to the Official Referee for assessment of damages. The allegation against the defendants was that they did not exercise sufficient care in the manufacture and the plaintiffs claimed a large sum as damages in consequence. The defendants said that the claim was excessive, and alleged that the damaged property was largely composed of old and dilapidated premises, which they desired to make the defendants replace with new buildings. A great deal of evidence was given on both sides, and in the course of the hearing the schedule of dilapidation was by agreement largely reduced in amount.

In the result the Official Referee gave judgment for the plaintiffs for £2,000, with costs, which amount included the sum of £128 for general damage owing to the shutting down of the plaintiffs' works in consequence of the explosion.

Chemical Works Director's Failure

Mr. George Davison, described as a chemist and company director, of Ferriby, near Hull, appeared for his public examination in bankruptcy at the Hull Bankruptcy Court on Monday. The debtor produced a statement of affairs showing liabilities of £3,768 13s. 7d., net assets £183 2s. 2d., and a deficiency of over £3,585 11s. 5d. He stated that in June, 1915, he purchased a chemist's business at Nuneaton for £500, of which £400 was borrowed money. He sold the business four years later for £5,000 and in addition he had 500 shares in a company which he sold to his wife for £400. In May, 1920, he went to Hull and invested £5,000 in the firm of E. H. Wrigglesworth, Ltd., manufacturing chemists, of which he became a director, and he subsequently sold 600 of these shares for £450. When he became a director it was agreed he should have a salary of £1,000 a year, but during the last eight months before the company went into voluntary liquidation in February, 1921, he only received £150. He went to Hull in answer to an advertisement in a trade paper.

The Official Receiver (Mr. J. E. D. Stickney): Did you make any inquiries about this company?

Debtor: Yes, and they were satisfactory.

Were you long in finding out it was not as profitable an investment as it looked?

Up to the time I went abroad in April, 1920, it was quite profitable.

Proceeding, debtor said that he sailed to Brazil, where he agreed to take out 2,000 shares in the Anglo-Brazilian Trading and Exploration Co., but he only paid over the sum of £500 because, after inspecting the property of the company, he came to the conclusion that it was not as had been described. He remained in Brazil for about five months doing analytical work, and whilst there he advanced a loan of £1,200 to a man named David R. Smith who was staying at the same hotel, but whose present address he did not know. In February, 1922, he invested £100 in the St. Stephen's (Hull) Manufacturing Co. and received at the rate of £300 a year until this company went into liquidation. He did not know whether either company would be able to pay a dividend. He attributed his insolvency entirely to the winding-up of E. H. Wrigglesworth, Ltd., in respect of which, along with four others, he was liable to the bank for £2,360.

The examination was closed.

Sulphate of Ammonia Price Scheme

Case Again Adjourned for Settlement

On Monday, in the King's Bench Division, before Mr. Justice Greer, the case of the British Sulphate of Ammonia Federation, Ltd., against the South Metropolitan Gas Co., which arose out of a dispute between the parties as to the proper method of keeping accounts in a pooling system and the equalisation of price system adopted as a consequence of the war, was mentioned again.

Mr. le Quesne said that since the matter was last before the Court the parties and their accountants had gone into the full accounts supplied, but the time had not been sufficient to enable the accountants to master the accounts. Counsel was not surprised at this, as the accounts were both voluminous and complicated.

Mr. Wyllie, for defendants, supported the application, and stated that the accounts had been found to be too complicated to deal with in the time at the accountants' disposal. If a further adjournment were granted he thought the result would be that the Court would not be further troubled with the case.

His Lordship, in ordering the case to stand over till November 29, hoped that the adjournment would result in the parties arriving at a settlement, as the case was eminently one which ought to be amicably settled.

Mr. Le Quesne said he hoped the case would be settled.

The case was postponed accordingly.

A Question of "Settlement in Full"

Judge Cluer referred to an important point very little known to business men, as to "settlement of account in full" in the Shoreditch County Court, on Friday, November 9. The case before the court was with reference to an account which, it was said by the defendant, the plaintiff had agreed to "settle in full" for a smaller sum than the original, That settlement he had made, but the plaintiff was now suing for the balance disregarding the settlement in full. Judge Cluer said it was little known, but it was perfectly legal to "settle in full," and then sue for the balance, if any. It was probably bad law, but it was 200 years old, and had been upheld by the House of Lords, so it still stood good. Supposing, for example, a man was owed £100 and was offered £90 "in full settlement." He accepted the offer, took the £90, and immediately sued for the balance remaining of £10, and in law there was no answer to the claim. If, on the other hand, the person settling the debt had added the smallest consideration, a collar stud, a tie, a pin, an apple, or anything, that would have settled the debt. It had to be £90 and a consideration for the balance, it could not be the £90 bare.

Chemical Industry in Czecho-Slovakia

The chemical industry is one of the youngest industries in Czecho-Slovakia. Until recently Germany supplied almost exclusively the country's requirements in chemical products, but the Czecho-Slovak production for some time past has tended to develop more and more. According to the *Gazette de Prague*, the union of producers of alizarine dyes, of which the headquarters are at Usti (Aussig), has put on the market several new dyes, notably sulphur products, which have met with appreciation. It is believed that efforts are being made at present with the view of producing synthetic indigo in Czecho-Slovakia, in the manufacture of which the Ostrava coal-tar would form a valuable element. It is also reported that the factory which is carrying out these investigations is also contemplating the extraction of nitrogen from the air on a large scale.

Rhineland Dyes Agreement

Representatives of the dyestuff industry in the Rhineland are reported to have signed an agreement with delegates of the Inter-Allied High Commission. The negotiations, which were attended by British delegates, were carried out with the help of French, Belgian, and Italian experts. By the terms of the agreement, the industrialists pledge themselves to resume regular reparation deliveries in conformity with the manner prescribed by the High Commission. They also agreed to Customs control over the despatch of goods from the factories.

From Week to Week

Two of the idle blast furnaces at Messrs. Pease's Tees Bridge works, County Durham, are to be rekindled next week.

MR. R. E. PRIESTLEY, fellow of Clare College, Cambridge, has been appointed lecturer in soil chemistry to the University.

DIXON'S SOAPWORKS, Rochdale, were completely destroyed by fire on Friday, November 9. The damage is estimated at about £30,000.

IT IS REPORTED by *The Times* that a preparation of insulin is being made in Czecho-Slovakia which will be obtainable at a much cheaper rate than elsewhere.

MR. PHILIP JOHN DURRANT, B.A., formerly scholar of Corpus Christi College, Cambridge, has been elected to a fellowship at Selwyn College, and appointed Lecturer in Natural Sciences.

AT MIDDLESBROUGH, Mr. Stanley Sadler, managing director of Sadler and Co., Ltd., the well known Middlesbrough firm of chemical manufacturers, was unanimously re-elected Mayor.

RECENT orders received by Meldrums, Ltd., of Timperley, include forced-draught furnaces for 16 boilers, mechanical stokers for five boilers, seven destructors, a disinfector, and a gas scrubber.

THE MIXED COMMISSION of the Belgian metallurgical industry, which consists of employers and employed, has decided, owing to the rise in the index number, to increase the wages of the workers by 5 per cent. as from November 11.

THE NOBEL Chemistry Prize for 1923 has been awarded to Professor Pregel Grarz, of Jugo-Slavia, for discoveries in connection with the nitro analysis of organic matter. The Nobel Prize for Physics has been awarded to Dr. Millikan, of Pasadena, California.

WILLIAM TEMPLE, a retired Bedlington miner, has invented a device which he claims detects atmospheric changes much sooner than a mercury barometer, and is specially designed to give early warning of dangerous gases in mines. Temple has patented several labour-saving inventions for coal mines.

THE UNIVERSITY OF ALBERTA has received a grant of 10,000 dollars from the Carnegie Foundation for research work. The grant is made with the particular purpose of enabling a continuation of the investigations of Dr. Collip, who was associated with Dr. Banting in the discovery of insulin.

MR. C. E. GARDNER, the new Mayor of Gloucester, is the chairman of directors of William Gardner and Sons (Gloucester), Ltd., the well known manufacturers of rolling and grinding mills, conveyors, storing plants, dust collecting plants and other mill machinery. This business was founded by the father of the new Mayor.

THE RIO TINTO COPPER CO., LTD., manufacturers of copper and other mineral commodities, have purchased a large acreage of land adjoining the river Tees at Middlesbrough, where it is proposed to erect new works which will give employment to a large number of men. The company also intend to build new wharves to deal with shipping traffic.

A NOVELTY in advertising methods is issued by Haughton's Patent Metallic Packing Co., Ltd., of London. This consists of desk-blotters bearing coloured photographs of bewitching young creatures, whose smiling faces arrest attention, and thus serve as gentle but insistent reminders of the "equipment accessories for gasworks and chemical works" in which the firm specialise.

THE AMERICAN VISITORS to England at present include Mr. Wilber Miller, President of the Davison Chemical Co., Baltimore, and of the Silica Gel Corporation, and vice-president of the American Association of Chemical Manufacturers. Mr. Miller, who is staying in London, has met a number of the leading figures in the British chemical industry, and was entertained the other evening to dinner.

CHANCE AND HUNT, LTD., announce that owing to the expansion of the merchant and export side of their business they have found it necessary to remove their London offices to more commodious premises, and that the address of their London office, on and after Monday, November 19, will be 5 and 7, St. Helen's Place, E.C.3. Telegrams: "Amonicid, Stock, London"; telephone: Avenue, 8863 (five lines).

ARTIFICIAL SILK yarn, composed of filaments inflated with air, and which appears to have tubes or bubbles inside the individual filaments, is sometimes referred to as artificial wool. Patents purporting to protect such a product have recently been taken out by two Frenchmen, and Courtauld's, Ltd., have instructed the solicitors to take proceedings for the revocation of these, on the ground, *inter alia*, that this inflated yarn is practically as old as the ordinary yarn with solid fibres.

THE 98TH COURSE of juvenile lectures at the Royal Institution, to be delivered this Christmas by Sir William Bragg, F.R.S., is entitled "Concerning the Nature of Things," and will deal with (1) "The Atoms of which things are made"; (2) "The Nature of Gases"; (3) "The Nature of Liquids" (4, 5 and 6) "The Nature of Crystals: (*a*) Diamond; (*b*) Ice and Snow; (*c*) Metals." The first lecture will be given on Thursday, December 27, 1923, and the succeeding ones on December 29, 1923, and January 1, 3, 5 and 8, 1924.

IT IS REPORTED from Manchester that the dispute between Manchester merchants and the Piece Dyers' Association on the contract terms has been settled by the withdrawal of the proposed new conditions by the Association. The suggested new contract terms provide for a reduction of ten per cent. on prices conditional on all orders being placed with members of the Piece Dyers' Association. The Manchester Chamber of Commerce initiated the objections to the proposals, and secured the co-operation of over 420 firms in resisting them. The Bradford Chamber co-operated with the Manchester Chamber throughout the dispute, and nearly 300 Bradford firms gave their support to the objections.

IN A LETTER published by *The Times* on Monday, Mr. C. D. Rotch asked the directors of the National Gallery to make a statement on the subject of the late Dr. Ludwig Mond's great bequest of Italian pictures to the nation, which became operative on the death of his widow in May last. The following day a statement was published by Sir Charles Holmes to the effect that negotiations for the handing over to the trustees of the National Gallery of the "Mond Bequest"—the collection of pictures left to the nation under the will of Dr. Ludwig Mond were not yet complete. The trustees would be meeting very shortly to discuss the question raised in Mr. Rotch's letter, and it might be possible in a week or two to make some announcement which would satisfy the public as to the future of this most valuable bequest.

AN OUTBREAK OF FIRE occurred on Sunday night at Lever House, the London house of Lever Brothers, soap and glycerine manufacturers. The building is an extensive one of five floors, and was formerly De Keyser's Hotel, while during part of the war it was occupied by the Royal Air Force. The building mainly consists of offices, and there are several shops on the ground floor. Although the outbreak was observed shortly before 11 o'clock, by midnight the fire had not been got under control. The task of the firemen became more difficult owing to the presence of gas, and three members of the Brigade were overcome and had to be removed in ambulances to St. Bartholomew's Hospital. The origin of the outbreak is unknown, but it was assumed that the fusing of electric light wires was the cause. It is believed that the fire had been burning for some time before it was observed and thus had secured a good hold before the arrival of the Brigade.

The Late Dr. E. K. Muspratt's Bequests

THE net estate of the late Dr. Edmund Knowles Muspratt, of Seaforth Hall, Seaforth, Liverpool, amounted to £434,841 15s. 1d. By his will Dr. Muspratt has given to the city of Liverpool the paintings, "Athens," by William Linton, and "Monarch of the Forest," by Keely Halswell. He also gave the painting, "Delos," by William Linton, to the National Gallery of Art, London, and the portrait of Sheridan Knowles, by Trautschold, and the marble bust of Lord Brougham, by Adams Acton, to the National Portrait Gallery, London. In the event of the non-acceptance of the two last-mentioned gifts, the paintings and busts are given to the city of Liverpool.

The testator also gave certain family portraits to his son, Sir Max Muspratt. Other legacies include £500 to Sir Max Muspratt as executor, also one management share and 26,584 ordinary shares in the *Liverpool Daily Post and Echo*, Ltd. To his son, Clifford Muspratt, 10,000 ordinary shares in the *Liverpool Daily Post and Echo*, Ltd. His furniture and household effects he gave in trust for division among his children in equal shares. The residue of his estate was also given to his seven children in equal shares. Probate is being applied for by Sir Max Muspratt, the sole executor.

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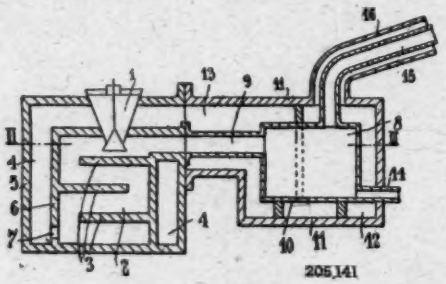
205,122. Tin Ores and Concentrates, Process for Treating. A. A. Lockwood, Woodford Lodge, Merton, London, S.W.19. Application date, April 12, 1922.

The object is to obtain a concentrate from tin ores by magnetic separation, without the losses previously entailed in the non-magnetic particles. The magnetically separated concentrate of the tin ore which has been roasted to render it magnetic, is mixed with a non-magnetic substance, whose particles differ in size from that of the non-magnetic particles of the concentrate. The mixture is again magnetically separated, and the residues screened to separate the admixed particles from the non-magnetic content of the concentrate. In an example, a tin concentrate containing 20 per cent. of specular iron is mixed with 3 per cent. of fine coal and roasted in a reducing atmosphere to transform the iron into magnetite. The iron is then separated magnetically, the concentration containing about 12 per cent. of tin. This is crushed to 100 mesh and mixed with sand screened to 60 mesh. This mixture is again magnetically separated and screened to separate the tin contents from the sand. The magnetic product is again mixed with sand and again magnetically separated. The product contains about 1 per cent. of tin.

205,141. Sulphur, Recovery and Refining of. C. S. Robinson, Somerset West, South Africa. Application date, June 12, 1922.

Sulphur of "99·5 per cent." purity usually contains traces of oily impurities which are liable to form a film over the sulphur when burned, which may extinguish it if the sulphur



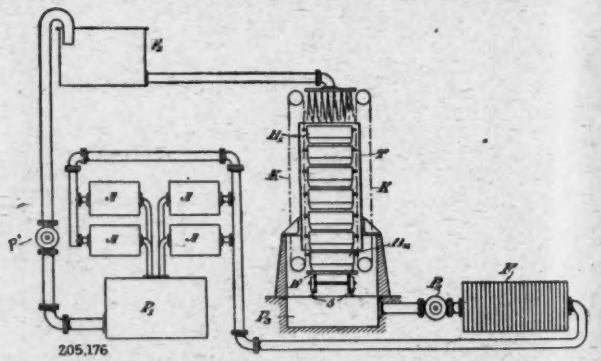
is not agitated while burning. The object is to purify or refine commercial grades of crude sulphur. The sulphur is fed through a hopper 1 to a chamber 2, having shelves 3 over which the sulphur passes to the bottom. Air is admitted through an opening 7 to burn part of the sulphur and vaporise the remainder. The sulphur vapour and sulphur dioxide pass by a conduit 9 to a chamber 8, where the sulphur is condensed and withdrawn through a pipe 14. The chamber may be provided with an outlet pipe 15 having a jacket 16 through which air is drawn into the apparatus, thereby condensing the remainder of the sulphur. The air passes around the chamber 8 to cool it, and then by passages 13, 4 to the inlet 7. The sulphur thus obtained is pale yellow in colour and is not contaminated by asphaltic or like material. The pre-heating of the air for combustion minimises the consumption of sulphur necessary for vaporising the remainder of the sulphur.

205,167. Phenol Formaldehyde Condensation Products, Production of. G. Petroff, Armianski, 7, Moscow, Russia. Application date, July 7, 1922.

In the condensation of phenols and formaldehyde, the mixture is first condensed under reduced pressure in the presence of only about 70-80 per cent. of the necessary formaldehyde, together with coal tars or mineral oils, or both. This product is then heated under atmospheric pressure to remove water and other volatile material, and the product is then mixed with the remainder of the formaldehyde, and the moulding and hardening operations carried out by means of heat. If large proportions of mineral oil or coal tar are used, emulsifying agents may also be added, such as aromatic sulphonic acids of high molecular weight, sulphonated castor oil, and alkali metal salts of the oxy-acids obtained by the oxidation of drying oils. The catalyst or accelerator may be barium, calcium, or strontium derivatives of phenols. In an example, a mixture of crystallised phenol 100 parts, neutral coal tar oil 15 parts, 40 per cent. formaldehyde 70 parts, and barium phenolate 10 parts, is first condensed and evaporated, and then mixed with a further 30 per cent. of formaldehyde and the hardening completed. In another example, a mixture containing cresylic acid, neutral coal tar oil, formaldehyde, and calcium cresolate, is used, together with an emulsifying agent as specified above. In some cases, no catalyst or accelerator is necessary in the first stage of the condensation. These products have good dielectric and damp-resisting qualities.

205,176. Electrolytic Extraction of Zinc from Ores and the Like, Process for. F. Hansgirg, 48, Körösistrasse, Graz, Austria. Application date, July 10, 1922.

In the former process for obtaining electrolytic zinc from neutral zinc sulphate solution, sulphuric acid is liberated and is then neutralised by a further quantity of ore, but this results also in the solution of iron, manganese, arsenic, antimony, cadmium, copper, etc., which may be present in the ore. In the present invention, this is avoided by lixiviating the zinciferous material with an acid whose hydrogen ion concentration corresponds to ordinary weak organic acids. The electrolyte need not be the salt of such an acid, but any other acid may be used having an anodic constancy, if the hydrogen concentration of the electrolyte is kept low by circulation. The



electrolyte is passed in counter-current over a zinc bearing material to neutralise free sulphuric acid which dissolves only the zinc. The electrolyte is then filtered and returned to the electrolytic cells.

The electrolyte flows from the electrolytic cells A to a collector V_1, and thence through a pump P^1 to a vessel V_2 and tower T. The tower is provided with riddles H_1, carrying the zinc-bearing material, through which the liquid percolates. Insoluble material is deposited in the tank V_3, and the electrolyte passes through a pump P_2 to a filter press F, and thence back to the cells A. The series of riddles is lifted periodically, the uppermost riddle removed, and replaced at the bottom by a riddle containing fresh material. With this process, the cathodes may remain in the cells for a long period, and may increase in weight to 40–60 kilograms. The circulation speed of the electrolyte depends on the current density and other conditions of electrolysis, but the free sulphuric acid content is usually not allowed to exceed 0·1 per cent. The filter may be dispensed with, if the residue is separated centrifugally. The leaching of the zinc-bearing material may be effected in the same apparatus, and a suitable apparatus for this purpose is described. The zinc-bearing material may be used in the form of briquettes, which are made by mixing with the electrolyte, and heating to 60° C.

205,195. Compositions or Preparations with Cellulose Derivatives, Manufacture of. H. Dreyfus, 8, Waterloo Place, London, S.W.1. Application date, July 13, 1922.

These compositions are suitable for making celluloid-like materials, photographic films, sheets, impregnating agents,

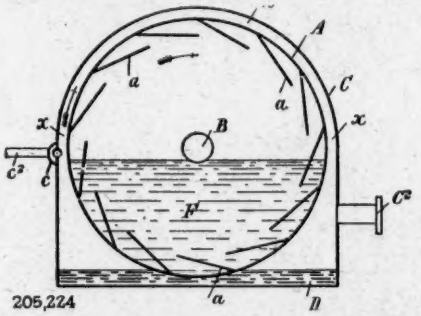
[Continued on page 549]

[*Continued from page* 548]

varnishes, etc., and consist of methyl cellulose, ethyl cellulose, benzyl cellulose, or other cellulose ethers, and plasticising agents. In this invention, the solvent or plasticising agent used is chloretone or trichloro-tertiary-butyl-alcohol (1 : 1 : 1-trichloro-2-methylpropanol-2). This substance boils at 176° C., has a high vapour pressure at ordinary temperature, is practically insoluble in water, but soluble in organic solvents such as acetone, ethyl acetate alcohol and chloroform, and has a melting point of 96°–97° C. It is obtained by condensation of acetone and chloroform. Other substances may be added, such as castor oil or other vegetable oil for softening the product, triphenyl phosphate, tricresyl phosphate, etc., for rendering the product less inflammable, and also filling or colouring materials.

205,224. SULPHUR DIOXIDE, MANUFACTURE OF AND APPARATUS FOR USE THEREIN. C. R. Houseman, of the British Oxygen Co., Ltd., North Wembley, Middlesex, and the British Oxygen Co., Ltd., Angel Road, Upper Edmonton, Middlesex. Application date, July 19, 1922.

The object is to obtain sulphur dioxide by burning sulphur in commercially pure oxygen without contamination of the gases with unburnt sulphur vapour. This is effected by



205,224

bringing the molten sulphur in the form of a film into contact with the gas and cooling it before the temperature has risen sufficiently to vaporise it. An iron or steel drum A is mounted on a hollow horizontal shaft B within a casing C, so that there is a narrow space *x* between the upper part of the drum and the casing. The lower part of the casing contains molten sulphur, into which the lower part of the drum dips. Oxygen is supplied by a pipe *c*, which has a narrow horizontal slit through which the oxygen is projected against the film of sulphur. The sulphur burns in the space *x*, and any excessive rise in temperature is prevented by conduction of the heat through the drum A to the water F within it. Steam thus generated passes off through the hollow shaft B. Conduction of heat away from the sulphur is facilitated by the blades *a*. The combustion of the sulphur becomes progressively slower owing to the consumption of the oxygen, and the sulphur dioxide which is drawn off at C^2 contains only traces of sulphur vapour. The speed of the drum A and the rate of supply of oxygen are regulated so that the film of sulphur is still molten on re-entering the bath of sulphur.

205,254. DICHLOR FLUORANE, PROCESS FOR THE MANUFACTURE OF. British Dyestuffs Corporation, Ltd., Imperial House, Kingsway, London, W.C., and H. H. Hodgson, 136, Paley Road, Bradford. Application date, July 29, 1922.

Dichlor fluorane or fluoresceine chloride has been manufactured by chlorinating fluoresceine. It is known that the homologue of dichlor fluorane may be made by condensing phthalic anhydride with metachlor-amino-cresol, using zinc chloride as a condensing agent, but it is not possible to apply this process to meta-chlor-phenol to obtain dichlor fluorane. It is now found that the condensation may be satisfactorily effected, using concentrated sulphuric acid, fuming sulphuric acid, or chlor-sulphonic acid as the condensing agent. The mixture is heated to 120°–140° C for six hours, and then to 150°–200° C. for four hours. The mixture is poured into water, boiled, the residue filtered, extracted with dilute caustic soda, and then with hot alcohol. The dichlor fluorane is used as an intermediate in the manufacture of rhodamine dyes.

205,268. COAL AND OTHER CARBONACEOUS SUBSTANCES, DESTRUCTIVE DISTILLATION OF. T. M. Davidson, Park Cottage, Sharps Lane, Ruislip, Middlesex. Application date, August 15, 1922.

The object is to obtain a high yield of gas of a high calorific value. The material is fed continuously through a horizontal retort towards the highest temperature zone, and the vapour and gas are drawn through the high temperature zone to the outlet. The distillation may be effected in apparatus of the kind described in Specification No. 195,711 (see THE CHEMICAL AGE, Vol. VIII, p. 518). The gas passes out through a central concentric tube passing through the retort, and the charge is compressed on reaching its plastic condition, so that a hard and dense residue is obtained. The inlet end of the retort is maintained at a low temperature, which rises to 500°-800° C. at the outlet end. An additional zone may be provided in the retort in which the coke is cooled, and the air supply for the combustion of gas or heating the retort is preheated.

205,269. CHLORIDISING ROASTING OF ORES AND OTHER METALLIFEROUS MATERIAL. A. L. Mond, London. From the International Process and Engineering Corporation, 42, Broadway, New York. Application date, August 15, 1922.

When some ores are subjected to roasting with alkali or alkaline earth chlorides it is found that the ore structure is too dense to give a satisfactory yield. In other cases, such as copper ores which contain bituminous, carbonaceous or other organic admixtures, the metal cannot be extracted satisfactorily by this method. It is now found that this difficulty may be avoided if the bituminous or carbonaceous materials are previously removed from the ores. This may be effected by means of solvents such as petrol, benzene, chlorinated hydrocarbons, *e.g.*, carbon tetrachloride, or the like. Alternatively the volatile hydrocarbons may be distilled off and condensed, or they may be used for heating the distillation or chloridising apparatus. Alternatively, the carbonaceous material may be removed by direct combustion without by-product recovery. The process is applicable to ores and materials containing lead, zinc, copper, silver, and gold.

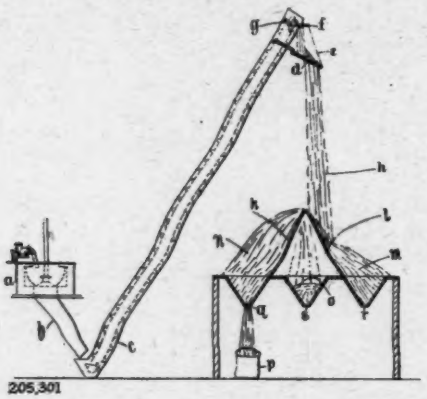
205,288. OXIDES OF NITROGEN AND NITRIC ACID, MANUFACTURE OF. C. J. Goodwin, 7–8, Idol Lane, London, E.C.3. Application date, September 5, 1922.

The process is for producing oxides of nitrogen and nitric acid by the explosion of combustible gas, such as coke oven gas or coal gas and air, with or without oxygen. It has been found that better results are obtained if the whole or part of the free hydrogen contained in the gas is previously removed. The process may be operated in conjunction with a synthetic ammonia process, since the oxygen obtained as a by-product in the production of nitrogen from air may be used for mixing with a combustible gas, and the hydrogen removed from the latter may be employed with the nitrogen for making ammonia. The hydrogen may be removed by fractional liquefaction, low-temperature separation, centrifugal separation, pressure fractionation, or by chemical means. The explosion gases are cooled and freed from oxides of nitrogen and nitric acid, and the residual gas may be used as a source of nitrogen for the manufacture of ammonia. This may be added to the nitrogen obtained from the atmosphere by removing the oxygen which is used for the explosion. The increase in efficiency by the removal of hydrogen appears to be due to an increase in the calorific value of the gas. In an experiment with coke oven gas having a calorific value of 3,700 calories per cubic metre the gas was freed from 85 per cent. of its hydrogen. This gas when exploded yielded about 250 grams of nitric acid per cubic metre, compared with 150-175 grams obtained from untreated coke oven gas. Instead of removing hydrogen by liquefaction, carbon monoxide may be added to the gas, which is then passed over a heated catalyst to obtain methyl or ethyl alcohol. The residual gas consists mainly of methane compressed ready for use.

205,301. AMMONIUM SULPHATE, DRYING OF. G. Weyman, the "Cwm," Saltwell Road, Gateshead-on-Tyne. Application date, September 14, 1922.

In the production of neutral and dry ammonium sulphate it has been found that the salt as discharged from the centrifuge or saturator has sufficient heat to dry it, if in free contact with the air. If any lumps which have formed in the centrifuge or saturator are crushed while still hot, and if the particles of

the salt are kept separate while cooling, it is found that the salt does not cake again. The crystals may be neutralised in a centrifuge *a*, and then passed through a shoot *b* to a belt conveyor *c*, which is used to avoid crushing the crystals. The salt then falls on to a screen *d* which is mechanically agitated by means of a chain *e*, pivoted lever *f*, and rotating arms *g*.



A device for crushing lumps may also be provided at this point. The crystals fall in a light shower, during which they are dried by the air, on to wooden grids *k*, *l*. The conveyor may be periodically adjusted so that the shower falls on the two grids alternately. The crystals are discharged through openings *q*, *v*, but a small quantity *o* passes through the grids. An arrangement of grids for stacking the salt in bulk is also described, in which the grids are parallel and slightly inclined to the vertical, and arranged in tiers. This keeps the mass open and permits ventilation.

205,304. Vat Dyestuffs, Manufacture and Production of. J. Y. Johnson, London. From Badische Anilin und Soda Fabrik, Ludwigshafen on Rhine, Germany. Application date, September 18, 1922.

Some derivatives of dibenzanthrone are described in specification 14,498/1912, which are obtained by the action of oxidising agents followed by reduction or condensation treatment. It is now found that dyestuffs of a brilliant green shade are obtained by alkylating as well as halogenating either of the dibenzanthrone derivatives. The dibenzanthrone derivatives may be heated with methyl-toluene sulphonate and halogen then introduced, or the condensation product referred to may be halogenated and then alkylated. Several examples are given.

Note.—Abstracts of the following specifications which are now accepted appeared in The Chemical Age when they became open to inspection under the International Convention:—188,657 (S. J. Vermaes and L. L. J. van Lijnden), relating to obtaining metals from their chloride vapours, see Vol. VIII, p. 69; 192,410 (E. Barbet et Fils et Cie), relating to a continuous process for producing large quantities of absolute alcohol, see Vol. VIII, p. 378; 197,315 (Compagnie de Bithune Soc. Anon.), relating to manufacture of ethyl from sulphovinic acid, see Vol. IX, p. 46.

International Specifications not yet Accepted

203,691. Furfural. Quaker Oats Co., 80, East Jackson Street, Chicago. (Assignees of C. S. Miner and H. J. Brownlee, 9, South Clinton Street, Chicago). International Convention date, September 7, 1922.

Raw material such as oat, rice or cottonseed hulls, corn cobs, etc., is charged into a rotating jacketed digester, mixed with sufficient acidified liquid to damp the mass, and steam is injected into it to remove the furfural continuously as formed. The pressure within the digester is maintained at about 60 lb. per sq. in. The condensed distillate is neutralised with slaked lime, and the furfural distilled off.

204,052. Vulcanising Indiarubber. Soc. Ricard, Allenet, et Cie., Distilleries des Deux-Sèvres, Melle, Deux-Sèvres, France. International Convention date, September 15, 1922.

Vulcanisation of rubber is accelerated by means of butyraldehyde-ammonia. This is obtained by treating butyric aldehyde with aqueous ammonia and dehydrating, or by treating butyric aldehyde with ammonia gas.

Latest Notifications.

206,469. Manufacture of condensation products from phenols and aldehydes. Bakelite Ges., and Dr. R. Hessen. November 4, 1922.

206,484. Process of purifying hydrocarbons. Barrett Co. November 3, 1922.

206,487. Manufacture of emulsions of bismuth salts. Hoffman-La Roche and Co., Akt.-Ges., F. November 1, 1922.

206,488. Manufacture of dye-stuffs of the azine group. Soc. Anon. des Matières Colorantes et Produits Chimiques de Saint-Denis. A. Wahl and R. Lantz. October 31, 1922.

206,489. Isolation of urea and its compounds. Soc. des Produits Azotes. November 3, 1922.

206,498. Method of producing oxides of nitrogen. H. G. A. Ramsay. November 2, 1922.

206,507. Process for producing new organic compounds of mercury. Dr. A. Albert. October 31, 1922.

206,512. Manufacture of condensation products from formaldehyde and urea, thio-urea, or their derivatives. F. Pollak. August 2, 1922.

206,516. Process for dehydrating alcohol for carburetting purposes. Soc. Ricard, Allenet, et Cie. November 4, 1922.

Specifications Accepted, with Date of Application

195,345. Methane, Process for the chlorination of. Holzverkohlungs-Industrie Akt.-Ges. March 27, 1922.

205,850. Centrifugal separators and the like. W. Mauss. June 26, 1922.

205,868. Purification of cracked hydrocarbon spirit. F. G. P. Remfry. July 22, 1922.

205,898. Viscose, Manufacture of. H. Dreyfus. July 27, 1922.

205,935. Separating liquids of different specific gravity, Methods of and means for. H. M. Alexander. August 15, 1922.

205,955. Alkali salts, Process for the manufacture of. Plauson's (Parent Co.), Ltd. (*H. Plauson.*) September 13, 1922.

205,984–5. Ores and other metallurgical products, Preparation of —for leaching process. C. Hennes. October 10, 1922.

206,029. Hydrocarbon oils, Distillation of. T. E. Robertson. (*Power Specialty Co.*) November 23, 1922.

206,083. *p*-phenetol-carbamide, Process for the manufacture of. A. Sonn. March 15, 1923.

Applications for Patents

Audianne, P., and Buchalard, G. Preparation of sulphuric anhydride. 28156. November 8.

Austerweil, G., and Peufaillet, L. Production of *p*-cymene from monocyclic terpenes. 28190. November 8. (Germany, November 8, 1922.)

Benson, M. Vulcanising caoutchouc, etc., and synthesising rubber compounds. 27738. November 5.

Betteridge, J. C. Filters. 28054. November 7.

Calder, W. A. S., and Chance and Hunt, Ltd. Condensing acid fumes during concentration of sulphuric acid. 28388. November 10.

Coppée, E. Manufacture of pure alcohol. 27804. November 5.

Coppée, E. Separation of volatile liquids. 27943. November 6.

Dreyfus, H. Manufacture of cellulose derivatives. 28008. November 7.

Harr, K. Manufacture of sintered magnesite and magnesite bricks. 27977. November 7. (Germany, November 14, 1922.)

Jackson, W. J. Mellersh-, and Koppers Co. Manufacture of alkali sulphides from thio-sulp ates. 27774. November 5.

Pratt, W. B. Production of aqueous emulsions of rubber, etc. 28062. November 7.

Ricard, Allenet, et Cie. Dehydrating alcohol for carburetting. 27791. November 5. (France, November 4, 1922.)

Roth, K. A., and Sanders, L. A. Manufacture of pigment colours and coloured powders. 28281. November 9.

Schmidt, J. Process for manufacture of malt extract, etc. 28395. November 10. (Germany, November 11, 1922.)

Schmidt, J. Process for manufacture of malt extract, etc. 28396. November 10. (Germany, September 17.)

Scottish Dyes, Ltd. Dyeing processes. 28169. November 8.

Techno-Chemical Laboratories, Ltd. Removal of water from peat, etc. 28077. November 7.

Versuchs- und Lehranstalt Für-Brauerei. Process for manufacture of malt extract, etc. 28397. November 10. (Germany, March 19.)

Villain, P. Manufacture of soaps, perfumes, disinfectants, etc. 28047. November 7.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report*

London, November 15, 1923.

TRADE during the current week has been moderately satisfactory, and there has been a fair amount of inquiry. Prices on the whole are firm, and the Continental position is still very obscure.

Supplies of Pharmaceutical Chemicals are becoming more and more difficult to obtain at anything like recent prices.

Export business continues uninteresting.

General Chemicals

ACETONE continues firm, although trade is very inactive.

ACID ACETIC.—Price is well maintained and a fair business has been transacted.

ACID CITRIC.—Price is unchanged, but trade is a little more active.

ACID LACTIC continues scarce and very firm.

ACID OXALIC maintains its firm position and is in better demand.

ACID TARTARIC is unchanged.

BARIUM CHLORIDE is in fairly good request, and the price seems to be a shade firmer.

FORMALDEHYDE is only in moderate demand but the price well held.

LEAD ACETATE continues its move upwards, and is inclined to be scarce.

LEAD NITRATE.—A fair amount of business is reported at last quoted figures.

LIME ACETATE continues firm, and a good forward business has been transacted.

LITHOPONE continues in good demand without change in value.

POTASSIUM CAUSTIC AND CARBONATE is only in moderately active demand.

POTASSIUM PERMANGANATE is very firm, with price tending upwards.

POTASSIUM PRUSSIATE.—Price is maintained and is in good demand.

SODIUM ACETATE.—The weaker tendency seems to have been arrested and the demand is a little better.

SODIUM HYPOSULPHITE.—A fair business is reported at English makers' figures.

SODIUM PRUSSIATE is higher, but business passing is still moderate.

SODIUM SULPHIDE in better request without change in value.

ZINC SALTS are unchanged.

Pharmaceutical Chemicals

ACETYL SALICYLIC ACID has advanced and closes firm, good business is reported.

ACETANILID has been in demand, and the outlook is firm.

ACID LACTIC.—Higher prices are asked by some holders, stocks are getting low.

ACID SALICYLIC is firmly held, only limited supplies being available for prompt delivery.

BROMIDES.—Firm but unchanged.

METHYL SALICYLATE is in steady demand at last prices.

PHENOLPHTHALEIN has advanced sharply, higher prices being readily paid.

SODA SALICYLATE.—Supplies are scarce. Considerable business has been transacted, and a further advance is anticipated.

SODA BENZOATE is higher—stocks cannot be replaced at present rates.

VANILLIN tends to harden in sympathy with cloves.

Coal Tar Intermediates

There is no great change in this market during the past week, and the Home Market has been confined to one or two lines although there is more interest on Export account.

ALPHA NAPHTHOL has been inquired for on export account.

ALPHA NAPHTHYLAMINE.—The price remains steady, with small Home trade demand.

ANILINE OIL AND SALT continues to be of interest for export with small home trade business passing.

BENZIDINE BASE.—Business remains on the quiet side at recent quoted figures.

BETA NAPHTHOL has been inquired for on both home and export account.

BETA NAPHTHYLAMINE is unchanged.

DIMETHYLANILINE has been of less interest than of late.

DINITROCHLORBENZOL.—Inquiries have been received for export, and the price is steady.

DIPHENYLAMINE is without special feature, and the price continues firm.

RESORCINE TECHNICAL.—Spot supplies seem rather short and the price is without change.

Coal Tar Products

The market generally continues to be steady with little variation in values.

BENZOL 90% is rather more offered, at 1s. 3d. to 1s. 3½d. per gallon on rails.

PURE BENZOL is neglected, but prices are unchanged.

CREOSOTE OIL is fairly steady, but the demand is not very active. To-day's prices are 8¾d. to 8½d. per gallon in the North, and 9¼d. per gallon in London.

CRESYLIC ACID is in rather better demand, but prices are unchanged at 1s. 10d. to 2s. per gallon for Pale quality 97/99%, and 1s. 6d. to 1s. 8d. per gallon for Dark 95/97%.

SOLVENT NAPHTHA is rather quiet, and the value is about 11d. per gallon on rails in the North.

HEAVY NAPHTHA is neglected, but there is not much quantity offering.

NAPHTHALENES.—The market is steady, but the demand for refined qualities is very limited. To-day's quotations are £6 10s. to £7 5s. per ton for low grade quality, £7 10s. to £8 for 74/76, and £8 10s. to £9 for 76/78 on rails. Refined is quoted at £16 per ton f.o.b.

PITCH.—The market is rather easier, and the demand extremely quiet. To-day's prices are 130s. to 132s. 6d. f.o.b. East Coast, 135s. to 137s. 6d., f.o.b. London.

Sulphate of Ammonia

There is no change in the position.

[Current Market Prices on following pages.]

A Directory of the Chemical Industries

THE firm of Kelly, who are world-famous for the compilation of directories, have recently re-issued their *Directory of the Chemical Industries*. Information is given concerning chemical manufacturers, manufacturing chemists, wholesale druggists, drysalters, chemists and drug stores (wholesale and retail). The publishers point out that the number of entries in which alterations were necessary was 41 per cent. of the total, which indicates very clearly the uselessness of an out-of-date directory.

The principal sections of the book are as follows: (1) An alphabetical arrangement of the names in the towns and villages under each county, with the populations; (2) A general classification of trades for London and its suburbs, i.e., classified lists of profession and trades with the names arranged alphabetically of those engaged therein; (3) A similar classification for the rest of England, Scotland and Wales; (4) The names for the principal towns of Ireland, arranged under towns and trades, and (5) the names of the Channel Islands and the Isle of Man, arranged under towns.

A particularly valuable feature is the list of proprietary brands and articles which gives the maker's name and address after the name of the articles. The directory, which is priced at 30s., is published by Kelly's Directories, Ltd., 186, Strand, London, W.C.2.

Current Market Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride, 90–95%	lb.	0	1	4	to	0	1	5
Acetone oil	ton	80	0	0	to	85	0	0
Acetone, pure	ton	127	10	0	to	130	0	0
Acid, Acetic, glacial, 99–100%	ton	73	0	0	to	74	0	0
Acetic, 80% pure	ton	48	0	0	to	49	0	0
Acetic 40% pure	ton	24	0	0	to	25	0	0
Arsenic, liquid, 2000 s.g.	ton	85	0	0	to	88	0	0
Boric, commercial	ton	48	0	0	to	52	0	0
Carbolic, cryst. 39–40%	lb.	0	1	1½	to	0	1	2½
Citric	lb.	0	1	5	to	0	1	5½
Formic, 80%	ton	52	0	0	to	54	0	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol.	ton	39	0	0	to	40	0	0
Lactic, 60 vol.	ton	45	0	0	to	47	0	0
Nitric, 80 Tw.	ton	24	0	0	to	25	0	0
Oxalic	lb.	0	0	6	to	0	0	6½
Phosphoric, 1.5	ton	35	0	0	to	38	0	0
Pyrogallic, cryst.	lb.	0	5	9	to	0	6	0
Salicylic, technical	lb.	0	1	9½	to	0	2	0
Sulphuric, 92–93%	ton	6	0	0	to	7	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	0½	to	0	1	1
Alum, lump	ton	12	10	0	to	13	0	0
Chrome	ton	23	0	0	to	24	0	0
Alumino ferric	ton	7	0	0	to	7	5	0
Aluminium, sulphate, 14–15%	ton	8	10	0	to	9	0	0
Sulphate, 17–18%	ton	10	10	0	to	11	0	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8
.880	ton	32	0	0	to	34	0	0
.920	ton	22	0	0	to	24	0	0
Carbonate	ton	30	0	0	to	32	0	0
Chloride	ton	50	0	0	to	55	0	0
Muriate (galvanisers)	ton	32	0	0	to	33	0	0
Nitrate (pure)	ton	35	0	0	to	40	0	0
Phosphate	ton	63	0	0	to	65	0	0
Sulphocyanide, commercial 90%	lb.	0	1	1	to	0	1	3
Amyl acetate, technical	ton	280	0	0	to	300	0	0
Arsenic, white powdered	ton	65	0	0	to	68	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Carbonate, Precip.	ton	15	0	0	to	16	0	0
Chlorate	ton	65	0	0	to	70	0	0
Chloride	ton	15	0	0	to	15	10	0
Nitrate	ton	33	0	0	to	35	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	0	11	to	0	1	0
Bleaching powder, 35–37%	ton	10	7	6	to	10	17	6
Borax crystals, commercial	ton	25	0	0	to		—	
Calcium acetate, Brown	ton	13	0	0	to	14	0	0
Grey	ton	22	0	0	to	23	0	0
Carbide	ton	13	0	0	to	13	10	0
Chloride	ton	5	15	0	to	6	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	80	0	0	to	90	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	1	to	0	1	2
Sulphate	ton	25	0	0	to	25	10	0
Cream Tartar, 98–100%	ton	86	0	0	to	88	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	64	0	0	to	65	0	0
Formusol (Rongalite)	lb.	0	1	11	to	0	2	0
Glauber salts, commercial	ton	4	0	0	to	4	10	0
Glycerin crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal	0	2	0	to	0	2	1
Iron perchloride	ton	18	0	0	to	20	0	0
Sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	42	0	0	to	44	0	0
Carbonate (White Lead)	ton	50	0	0	to	52	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	37	0	0	to	39	0	0
Lithophone, 30%	ton	22	10	0	to	23	0	0
Magnesium chloride	ton	3	10	0	to	3	15	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	5	15	0	to	6	0	0
Sulphate (Druggists')	ton	8	0	0	to	9	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	45	0	0	to	50	0	0
Methyl acetone	ton	82	0	0	to	85	0	0
Alcohol, 1% acetone	ton	105	0	0	to	110	0	0
Nickel sulphate, single salt	ton	37	0	0	to	38	0	0
Ammonium sulphate, double salt	ton	37	0	0	to	38	0	0

	Per	£	s.	d.		£	s.	d.
Potash, Caustic	ton	30	0	0	to	32	0	0
Potassium bichromate	lb.	0	0	5½	to	0	0	6
Carbonate, 90%	ton	30	0	0	to	31	0	0
Chloride, 80%	ton	9	0	0	to	10	0	0
Chlorate	lb.	0	0	3½	to		—	
Metabisulphite, 50–52%	ton	65	0	0	to	70	0	0
Nitrate, refined	ton	38	0	0	to	40	0	0
Permanganate	lb.	0	0	10	to	0	0	10½
Prussiate, red	lb.	0	2	10	to	0	3	0
Prussiate, yellow	lb.	0	0	10½	to	0	0	11
Sulphate, 90%	ton	10	0	0	to	10	10	0
Salammoniac, firsts	cwt.	3	3	0	to		—	
Seconds	cwt.	3	0	0	to		—	
Sodium acetate	ton	25	0	0	to	25	10	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4½	to	0	0	4½
Bisulphite, 60–62%	ton	21	0	0	to	23	0	0
Chlorate	lb.	0	0	3	to	0	0	3½
Caustic, 70%	ton	17	10	0	to	18	0	0
Caustic, 76%	ton	18	10	0	to	19	0	0
Hydrosulphite, powder	lb.	0	1	5	to	0	1	6
Hyposulphite, commercial	ton	10	10	0	to	11	0	0
Nitrite, 96–98%	ton	27	10	0	to	28	0	0
Phosphate, crystal	ton	16	0	0	to	16	10	0
Perborate	lb.	0	0	11	to	0	1	0
Prussiate	lb.	0	0	5½	to	0	0	6
Sulphide, crystals	ton	8	10	0	to	9	0	0
Sulphide, solid, 60–62 %	ton	14	10	0	to	15	10	0
Sulphite, cryst.	ton	11	10	0	to	12	0	0
Strontium carbonate	ton	50	0	0	to	55	0	0
Nitrate	ton	50	0	0	to	55	0	0
Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Flowers	ton	11	0	0	to	11	10	0
Roll	ton	9	15	0	to	10	10	0
Tartar emetic	lb.	0	0	11½	to	0	1	0
Tin perchloride, 33%	lb.	0	1	1	to	0	1	2
Perchloride, solid	lb.	0	1	3	to	0	1	4
Protochloride (tin crystals)	lb.	0	1	4	to	0	1	5
Zinc chloride 102° Tw.	ton	20	0	0	to	21	0	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	42	0	0	to	45	0	0
Dust, 90%	ton	50	0	0	to	55	0	0
Sulphate	ton	15	0	0	to	16	0	0

Pharmaceutical Chemicals

Acetyl salicylic acid	lb.	0	3	6	to	0	3	9
Acetanilid	lb.	0	2	3	to	0	2	6
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	2	8	to	0	3	0
Salicylic, B.P.	lb.	0	2	4	to	0	2	6
Tannic, leviss.	lb.	0	3	2	to	0	3	4
Amidol	lb.	0	7	6	to	0	8	0
Amidopyrin	lb.	0	13	6	to	0	14	0
Ammon ichthosulphonate	lb	0	1	10	to	0	2	0
Barbitone	lb.	0	16	6	to	0	17	0
Beta naphthol resublimed	lb	0	2	0	to	0	2	3
Bromide of ammonia	lb	0	0	10	to	0	1	0
Potash	lb.	0	0	7½	to	0	0	8½
Soda	lb.	0	0	8	to	0	0	9
Caffeine, pure	lb.	0	11	0	to	0	11	6
Calcium glycerophosphate	lb.	0	5	9	to	0	6	0
Lactate	lb.	0	1	10	to	0	2	0
Calomel	lb.	0	3	9	to	0	4	0
Chloral hydrate	lb.	0	4	0	to	0	4	3
Cocaine alkaloid	oz.	0	19	6	to	1	0	0
Hydrochloride	oz.	0	16	9	to	0	17	3
Corrosive sublimate	lb.	0	3	3	to	0	3	6
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	2	6	to	0	2	8
B.P. (75–80% eucalyptol)	lb.	0	2	7	to	0	2	9
Guaiacol carbonate	lb.	0	12	0	to	0	12	6
Liquid	lb.	0	8	9	to	0	9	3
Pure crystals	lb.	0	9	3	to	0	9	9
Hexamine	lb.	0	4	0	to	0	4	3½
Hydroquinone	lb.	0	4	0	to	0	4	3
Lanoline anhydrous	lb.	0	0	7	to	0	0	7½
Lecithin ex ovo	lb.	0	17	6	to	0	19	0
Lithi carbonate	lb.	0	9	6	to	0	10	0
Methyl salicylate	lb.	0	2	10	to	0	3	3
Metol	lb.	0	9	0	to	0	10	0
Milk sugar	cwt.	4	2	6	to	4	10	0
Paraldehyde	lb.	0	1	5	to	0	1	6
Phenacetin	lb.	0	7	0	to	0	7	6
Phenazone	lb.	0	8	6	to	0	9	0
Phenolphthalein	lb.	0	8	0	to	0	8	6
Potassium sulpho guaiacolate	lb.	0	7	0	to	0	7	6
Quinine sulphate, B.P.	oz.	0	2	3	to		—	

	Per	£	s.	d.		£	s.	d.
Resorcin, medicinal	lb.	0	5	9	to	0	6	0
Salicylate of soda powder	lb.	0	2	10	to	0	3	0
Crystals	lb.	0	2	11	to	0	3	1
Salol	lb.	0	4	0	to	0	4	3
Soda Benzoate	lb.	0	3	0	to	0	3	3
Sulphonal	lb.	0	16	0	to	0	16	6
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	11	0	to	0	11	6
Soda salicylate	lb.	0	8	6	to	0	9	0
Vanillin	lb.	1	3	0	to	1	4	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	2	0	to	0	2	3
Refined	lb.	0	2	6	to	0	2	9
Alphanaphthylamine	lb.	0	1	6½	to	0	1	7
Aniline oil, drums extra	lb.	0	0	9	to	0	0	9½
Salts	lb.	0	0	9½	to	0	0	10
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	2	6	to	0	2	9
Benzidine, base	lb.	0	4	9	to	0	5	0
Sulphate	lb.	0	3	9	to	0	4	0
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol	lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical	lb.	0	4	0	to	0	4	3
Croceine Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	11	to	0	1	0
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	4	to	0	1	5
Dinitrophenol	lb.	0	1	6	to	0	1	7
Dimethylaniline	lb.	0	2	9	to	0	3	0
Diphenylamine	lb.	0	3	6	to	0	3	9
H-Acid	lb.	0	4	9	to	0	5	0
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	8	6	to	0	9	6
Naphthionic acid, crude	lb.	0	2	6	to	0	2	8
Naphthionate of Soda	lb.	0	2	6	to	0	2	8
Naphthylamine-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Nevill Winther Acid	lb.	0	7	3	to	0	7	9
Nitrobenzol	lb.	0	0	7	to	0	0	8
Nitronaphthalene	lb.	0	0	11½	to	0	1	0
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-amidophenol, base	lb.	0	8	6	to	0	9	0
Hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	9	to	0	0	10
Paranitraniline	lb.	0	2	7	to	0	2	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	12	6
Paratoluidine	lb.	0	5	6	to	0	5	9
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	10	to	0	0	11
Tolidine, base	lb.	0	7	3	to	0	7	9
Mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

Essential Oils.		£	s.	d.
Anise	c.i.f. 1/9 spot	0	1	10
Bay		0	12	0
Bergamot		0	13	6
Cajaput		0	3	3
Camphor, white	per cwt.	4	0	0
Brown	„	3	15	0
Cassia	c.i.f. 9/6 spot	0	11	0
Cedarwood		0	1	6
Citronella (Ceylon)	very firm c.i.f. 3/10½ spot	0	4	2
(Java)	very firm & dearer c.i.f. 4/4 spot	0	4	7
Clove	dearer	0	9	0
Eucalyptus		0	2	6
Geranium Bourbon		1	15	0
Lavender		1	4	0
Lavender spike		0	3	3
Lemon		0	2	10
Lemongrass	per oz.	0	0	2½
Lime (distilled)		0	4	0
Orange sweet (Sicilian)		0	10	6
(West Indian)		0	8	6
Palmarosa		1	3	0
Peppermint (American)	dearer	0	15	6
Mint (dementholised Japanese)	firmer	0	12	0
Patchouli		1	10	0
Otto of Rose	per oz.	1	15	0
Rosemary		0	1	7
Sandalwood		1	6	0
Sassafras	dearer	0	7	6
Thyme	2/6 to	0	8	0

Synthetics.		£	s.	d.
Benzyl acetate	per lb.	0	3	3
Benzoate	dearer „	0	3	6
Citral	„	0	9	6
Coumarine	„	1	0	0
Heliotropine	„	0	8	0
Ionone	„	1	5	0
Linalyl acetate	„	1	2	6
Methyl salicylate	„	0	3	0
Musk xylol	„	0	12	6
Terpeniol	„	0	2	9

The German Potash Industry

The *Berliner Tageblatt* of November 2, in a report forwarded to the Department of Overseas Trade by the Commercial Secretary at Berlin (Mr. J. W. F. Thelwall) states that, according to a circular issued by the German Potash Syndicate, although as ascertained by the Reich Ministry of Economics the costs of production of the potash industry have risen by 7½ per cent. during the last few days, the Potash Syndicate had refrained at present from increasing prices. The repeated demands of the workers for gold wages which should be gradually adjusted to pre-war rates would, in the opinion of the Syndicate, lead, in connection with the pending reform of the currency, to a still further increase in the costs of production and thereby to new price advances, the extent of which could not be foreseen.

During the past few weeks practically no orders have been received from German agriculture, whose demand, as before, forms the backbone of the German potash industry. It may be hoped that the introduction of the annuity mark will remove the chief difficulty as regards the purchase of potash salts. In order, on their part, to encourage the immediate placing of orders and thus at the same time to contribute towards bringing about the resumption of manuring in the interests of the new harvest, the Potash Syndicate, in agreement with agricultural associations and trade organisations, have decided to grant the following concessions to consumers. As from November 1, all orders received for execution before November 17 will be carried out at the current price with a goods discount of 450 kilos, all orders received by November 24 with a goods discount of 300 kilos, and all orders received by November 30 with a goods discount of 150 kilos per truck of 15,000 kilos. Further, the Syndicate have given instructions to the works that in the first period up to November 17, 15,000 kilo trucks shall be loaded with 15,600 kilos, agricultural associations and dealers to charge customers as for 15,150 kilos only. During the second period only 15,300 kilos of the 15,600 kilos may be so charged for. During the third period 15,300 kilos will be delivered, of which only 15,150 kilos may be charged for. Farmers will thus actually receive 450, 300 and 150 kilos respectively of potash salts, free of all cost, according to when their orders are received for prompt delivery.

As before, payment must be made within seven days from the date of the invoice. Paper mark payments will be converted at the rate current on the day following that on which the amount is received at the works' Berlin bank. In order to avoid exchange fluctuations, etc., customers are recommended to obtain gold loan certificates, annuity marks, or dollar treasury certificates on placing their orders.

Acid-Resisting Garments

Good acid-proof and acid-resisting cloth and garments are as valuable to the man who has only occasionally to handle acids or materials which burn or stain as they are to the constant worker in the chemical works, warehouse, or laboratory. One of the best fabrics introduced for the purpose is that known as "Aswaproof," which the makers (J. H. Hartley and Co., Manchester) claim to be not only proof against acids and water, but resistant to grease and alkalis as well.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, November 15, 1923.

DURING the past week business in the heavy chemical market has shown some slight improvement, but the quantities asked for are small, buyers being apparently not inclined to stock owing to unsettled conditions on the Continent.

Prices on the whole are steady, with Continental quotations easier than a week ago.

Industrial Chemicals

ACID ACETIC.—Glacial 98/100%, £60 to £65 per ton, in casks; 80% pure, £50 to £52 per ton; 80% technical, £47 to £48 per ton, c.i.f. U.K. ports. Duty free.

ACID BORACIC.—Crystals or granulated, £48 per ton; powdered, £50 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC (ICE CRYSTALS).—Unchanged at about 1s. 1½d. per lb., f.o.b. U.K. port. Moderate inquiry.

ACID CITRIC (B.P. CRYSTALS).—Some little inquiry. Spot materials quoted 1s. 3¾d. per lb., less 5 per cent. ex store.

ACID FORMIC 85%.—Dealers now quoting £50 to £51 per ton, ex store, spot delivery.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC.—Price about 5¾d. per lb., ex store, but could probably be obtained for less.

ACID SULPHURIC.—144°, £3 15s. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC.—B.P. Crystals. Unchanged at about 1s. 1d. per lb., less 5 per.cent. ex wharf, early delivery.

ALUMINA SULPHATE.—17/18% iron free. In moderate demand spot lots quoted £8 10s. per ton, ex store.

ALUM, CHROME.—Maker's prices unchanged at £24 to £27 per ton according to quality, f.o.b. U.K. ports. Some cheaper spot lots available at about £21 to £22 per ton, ex store.

ALUM, POTASH (LUMP).—English material unchanged at £10 17s. 6d. per ton, f.o.b. U.K. port. Continental, in lumps now offered at £9 12s. 6d. per ton, c.i.f. U.K. port. Spot lots about £10 15s. per ton, ex store.

AMMONIA, ANHYDROUS.—In little demand. Price unchanged at about 1s. 5½d. per lb., ex station, spot delivery.

AMMONIA, CARBONATE.—Moderate export inquiry. Lump quoted, £29 5s. per ton; powder, £31 per ton delivered, f.o.b. U.K. port.

AMMONIA LIQUID 880°.—Unchanged at 3d. per lb. delivered; containers extra.

AMMONIA MURIATE.—Grey galvanizers quality about £31 to £32 per ton f.o.r. works. Offered from the continent at about £28 per ton, c.i.f. U.K. ports. Fine white crystals offered from the continent at £24 17s. 6d. per ton, c.i.f. U.K. port. Spot lots about £27 per ton, ex store.

AMMONIA SULPHATE.—25¼% material, £13 2s. per ton; 25¾% neutral quality, £14 5s. per ton, ex works, November delivery.

ARSENIC, WHITE POWDERED.—Good export inquiry. Quoted about £66 per ton, f.o.b. U.K. port. Spot lots now about £70 to £71 per ton, ex store.

BARIUM CHLORIDE 98/100%. — English material about £14 17s. 6d. per ton. Continental offered at £13 10s. per ton, ex store, spot delivered.

BARYTES.—Finest white English unchanged at £5 5s. per ton, ex works. Good quality continental material offered at £5 per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—Spot lots, £11 5s. per ton, ex station. Contracts 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystal, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations. Minimum ton lots.

CALCIUM CHLORIDE.—English material, £5 12s. 6d. per ton, ex station. Offered for export at about £4 10s. per ton, f.o.b. U.K. port. Continental material now quoted about £4 5s. per ton, c.i.f. U.K. port.

COPPERAS, GREEN.—Unchanged at about £2 2s. 6d. per ton, f.o.b. for export.

COPPER, SULPHATE.—Quoted £25 7s. 6d. per ton, less 5%, f.o.b. U.K. port.

FORMALDEHYDE, 40%.—Moderate inquiry. Spot lots offered at about £60 to £63 per ton, ex store.

GLAUBER SALTS.—Fine white crystals. Continental quotations inclined to be higher, now quoted at £2 17s. 6d. per ton, c.i.f. U.K. port. Spot lots, £3 10s. per ton, ex store.

LEAD, RED.—English material advanced to £45 per ton carriage paid U.K. station. Continental quoted £36 per ton, c.i.f. U.K. ports. Spot material now offered at about £37 15s. per ton, ex store.

LEAD, WHITE.—Offered from the Continent at £37 per ton, c.i.f. U.K. port.

LEAD ACETATE.—While crystals quoted £43 per ton, ex wharf, spot delivery. Brown, about £41 per ton. White crystals offered from the Continent at about £39 5s. per ton, c.i.f. U.K. port.

MAGNESITE, CALCINED.—Finest English ground quoted £8 per ton, ex station. Good continental material on offer at about £7 5s. per ton, c.i.f. U.K. port.

MAGNESIUM CHLORIDE.—Continental quotations inclined to be lower. Now offered at £2 5s. per ton, c.i.f. U.K. ports, prompt shipment. Spot lots quoted £3 5s. per ton, ex store.

MAGNESIUM SULPHATE (EPSOM SALTS).—Commercial quality offered at about £5 per ton, ex store. B.P. quality, £6 5s. per ton, ex station, prompt delivery.

POTASH CAUSTIC, 88/92%.—Also inclined to be a little easier. Now offered at £28 per ton, c.i.f. U.K. port. Spot material unchanged at about £31 per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 5¾d. per lb., delivered.

POTASSIUM CARBONATE. 96/98%.—Continental offers inclined to be higher at about £25 per ton, c.i.f. U.K. ports. Spot lots quoted £27 per ton, ex store.

POTASSIUM CHLORATE.—Unchanged at about 3d. per lb.

POTASSIUM NITRATE (SALTPETRE).—Offered from the Continent at £26 per ton, c.i.f. U.K. port. Spot lots about £30 per ton, ex store.

POTASSIUM PERMANGANATE.—B.P. crystals, spot material scarce. Now quoted 10½d. per lb., ex store.

POTASSIUM PRUSSIATE (YELLOW).—Moderate export inquiry. Price about 10½d. per lb., f.o.b. U.K. port. Spot lots about 11d. per lb., ex station.

SODA CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62% broken, £19 2s. 6d. per ton; 98/99% powdered, £22 15s. per ton. All ex station spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Unchanged at about £24 per ton, ex store, spot delivery. Offered from the continent at about £22 17s. 6d. per ton, c.i.f. U.K. port.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—Unchanged at 4½d. per lb., delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station. Alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—Commercial crystals offered from the continent at £9 7s. 6d. per ton, c.i.f. U.K. port, spot lots about £10 5s. per ton, ex store. Pea crystals, £14 10s. per ton, ex store.

SODIUM NITRATE.—Refined 96/98% quality quoted £13 5s. per ton, f.o.r. or f.o.b. U.K. port.

SODIUM NITRITE, 100%.—Quoted £26 to £27 10s. per ton according to quantity, f.o.b. U.K. port.

SODIUM PRUSSIATE (YELLOW).—Now quoted 5½d. per lb., ex store, in little demand.

SODIUM SULPHATE (SALTCAKE).—Makers advise increase in price as from November 12, to £4 5s. per ton, carriage paid stations for home consumption. Moderate export inquiry, and higher prices obtained.

SODIUM SULPHIDE.—60/65% solid, £14 per ton, ex station; broken, £1 per ton more; 31/34%, crystals, £8 15s. per ton, ex station.

SULPHUR.—Flowers, £10 per ton; roll, £9 per ton; rock, £9 per ton; ground, £8 per ton. Prices nominal.

TIN, CRYSTALS.—Unchanged at 1s. 4d. per lb. Moderate export inquiry.

ZINC CHLORIDE.—98/100%, solid. English material unchanged at about £26 per ton, f.o.b. U.K. port. Continental material now about £25 per ton, c.i.f. U.K. port.

ZINC SULPHATE.—Spot lots of Continental material on offer at about £14 10s. per ton, ex store.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHYLAMINE.—Small home demand. Price 1s. 6d. lb., delivered.

BETA NAPHTHOL.—Price remains firm at 1s. 1d. lb., delivered.

BENZALDEHYDE.—Small home inquiry. Offered at 2s. 6d. per lb., delivered.

DIPHENYLAMINE.—Several inquiries, both home and export. Price 3s. 3d. lb., delivered, or f.o.b.

META TOLUYLENE DIAMINE.—Export inquiry. Price now 4s. lb., f.o.b.

META PHENYLENE DIAMINE.—Export inquiry. Price quoted 4s. 6d. lb., f.o.b.

PHTHALIC ANHYDRIDE.—Good export inquiries. Price 2s. lb., f.o.b.

MONO NITRO NAPHTHALENE.—Export inquiry. Price quoted 11d. per lb., f.o.b.

"S" ACID.—Export inquiry. Price 13s. lb. f.o.b., U.K. port.

The "Vickcen" Centrifugal Oil Separator

SEVERAL interesting devices have recently been evolved for enabling ships to comply with the Oil in Navigable Waters Act. Oil-bearing steamers frequently fill their oil tanks with salt water after the oil in the tank has been either expended or discharged. When these tanks are again pumped out the water pumped from the tank is necessarily contaminated with a certain proportion of oil. Oil is also inevitably present in the bilges of such ships, and under the Oil in Navigable Waters Act it is an offence to pump this contaminated water into harbours or docks on account of the pollution caused. The devices which have been evolved principally have in mind the object of discharging oil-free water into the harbour. There is, however, another and extremely important aspect of this operation. The oil as recovered from these devices still contains a proportion of water and dirt rendering it, as a rule, unfit for actual use as a fuel without further treatment. This water and dirt are usually so intimately mixed with the oil as to form an emulsion, and no matter how long this is allowed to settle it never separates. Some force of much greater magnitude than gravity must be applied to break it into its component parts of pure oil, water, and dirt. An entirely British made centrifugal oil purifier has been produced, by means of which it is possible rapidly and efficiently to purify this recovered oil, rendering it fit for further use.

This new machine is known as the "Vickcen" oil purifier, and is handled by British Separators, Ltd., of 161, Queen's Road, Peckham, who are associated with Vickers, Ltd. It has already been largely used on board ship for the purification of fuel oil and lubricating oil in connection with marine power plants and for the same purpose in connection with land power plants, and also for the dehydration of transformer oil. The mixture of oil, water, and dirt flows into a cup at the top of the machine; below this are three spouts. From the bottom is discharged the water and dirt, and from the one above the pure oil. The top one is merely a safety device. The machine will run for hours with practically no attention. It enables compliance with the Oil in Navigable Waters Act to become in some cases an actual commercial advantage owing to the rapid and efficient recovery of oil in a fit state for use.

The Manchester Chemical Market

[FROM OUR OWN CORRESPONDENT].

Manchester, November 15, 1923.

CHEMICAL traders here report little change in the position of the market from that of last week, or, for that matter, from conditions which have been reported in this column during the past month. Buying in the aggregate amounts to a fairly satisfactory volume, the individual transactions as a rule are small and mainly for immediate needs. Export trade is better and a quietly steady business is being done, principally on Colonial account and for parcels of the leading heavy chemicals. There has been little or no further weakening of prices.

Heavy Chemicals

Bleaching powder at the moment is only in quiet demand, but prices are firm at £11 5s. per ton. Saltcake is being actively called for for export, though home consumption is of limited extent; prices are maintained at £4 5s. to £4 10s. per ton. Caustic soda is firm at from £16 17s. 6d. per ton for 60 per cent. material to £19 7s. 6d. for 76-77 per cent., a fair volume of business being put through. Sodium sulphide is quiet but steady at £14 per ton for 60–65 per cent. concentrated solid and £8 10s. to £9 per ton for crystals. Hyposulphite of soda is inactive, though quotations are unchanged from last week, to-day's values being £14 10s. per ton for photographic crystals and £9 to £9 10s. per ton for commercial. Nitrite of soda is firm and in quietly steady demand at £26 10s. per ton. Prussiate of soda is maintained at 5½d. to 5¾d. per lb. though orders are not too numerous. Acetate of soda is fairly active at round £24 per ton. Bicarbonate of soda meets with a steady demand at £10 10s. per ton. Glauber salts are quiet but unchanged at about £3 10s. per ton. Phosphate of soda is maintained at last week's figure of £14 to £14 10s. per ton, but business is still on a restricted scale. Alkali is firm at £7 10s. per ton for 58 per cent. material, and the demand is good both for home consumption and for shipment. Bichromate of soda is steady and fairly active at 4½d. per lb. Chlorate of soda is also in moderate inquiry at 2¾d. per lb. Soda crystals are quiet at £5 5s. per ton.

Caustic potash meets with a quietly steady demand and prices are maintained at last week's level of £30 per ton for 88–90 per cent. Carbonate of soda is on offer at about £23 per ton for 90 per cent. and £25 per ton for 96 per cent. material. Permanganate of potash is only in quiet request at 8½d. to 9d. per lb. Yellow prussiate of potash is rather featureless though quotations are steadier at 10½d. to 11d. per lb. Chlorate of potash is in fair demand at 2¾d. to 3d. per lb.

On a continued improved demand for shipment arsenic keeps very firm, and to-day's value for white powdered, Cornish makes, is between £68 and £69 per ton, Manchester. Nothing much is being done in sulphate of copper though prices are unchanged at about £25 per ton. Epsom salts, commercial, are in fair inquiry at £4 to £4 10s. per ton, with magnesium sulphate, B.P., quoted at £6. Nitrate of lead is only moderately active but prices are firmer in sympathy with the metal, current values being round £43 10s. per ton. Acetates of lead are on offer at £41 for white, with brown in short supply at £45 per ton. Acetate of lime is fairly active at £21 10s. to £22 for white and £12 10s. per ton for brown.

Acids and Tar Products

Tartaric and citric acids are still dull sections, with prices, however, about unchanged at 1s. 1¾d. and 1s. 4¾d. per lb. respectively. Oxalic acid is very inactive at 5½d. to 5¾d. per lb. Acetic acid is in quiet demand at £46 per ton for commercial and about £62 for glacial.

Not much actual trade is being done in pitch though prices are steady but more or less nominal at £6 10s. to £7 per ton, Manchester. Except in the crude qualities naphthalines are quiet with quotations steady at from £19 to £20 per ton for refined and from £6 to £11 per ton for crude. Creosote oil is firm at 9d. per gallon. Solvent naphtha keeps quiet but steady at 1s. 2d. to 1s. 3d. per gallon. Quotations for carbolic acid are nominally unchanged, though offers are said to be less firm; current values are round 3s. 6d. per gallon for crude and 1s. 2d. per lb. for crystals.

Company News

THE "SANITAS" CO., LTD.—An interim dividend at the rate of 9 per cent. per annum on the preference shares of the company has been declared and will be payable on and after December next.

ALUMINIUM CORPORATION.—The directors recommend a dividend of 7 per cent. on the preference stock and shares for the past year, carrying £6,096 forward. A similar payment was made last year.

SCARAB OIL BURNING CO.—The accounts for the year ended February last, after deducting £1,398 for loss on exchange, show a loss of £16,610, which increases the debit balance to be carried forward to £22,544.

LONDON NITRATE CO.—The directors recommend a final dividend for the year to end of June last of 1s. 6d. per share, free of tax, making 2s. 6d. per share (12½ per cent.), free of tax, for the year. It is proposed to place £30,000 to reserve for redemption of debentures.

AMALGAMATED ZINC (DE BAVAY'S).—It is announced that, in accordance with instructions received from head office, Melbourne, a dividend of 1s. per share, less tax, will be paid on December 5 to all members on the London register at the close of business on November 20.

LAWES' CHEMICAL MANURE CO.—The accounts for the year to June 30 last show a loss of £22,294. The directors recommend that £19,512 be written off contingent fund, closing that account, and £2,782 is carried forward. The annual meeting will be held at the Great Eastern Hotel, Liverpool Street, London, on November 23, at 11 a.m.

WEARDALE LEAD CO.—The report for the 12 months ended September 30 last states that the net profit, including income from investments, amounts to £14,802, compared with £12,296 for the preceding year. The directors recommend a final dividend of 1s. 6d. per share, making 10 per cent. for the year (against 6 per cent. for 1921-22), carrying forward £5,083. The annual meeting will be held at the Central Station Hotel, Newcastle-on-Tyne, on November 21, at noon.

SANTA CATALINA NITRATE CO.—The gross profit for the year ended June 30 last was £21,733. After deducting London expenses £1,738, and charging stoppage of works expenses £4,424, starting-up expenses £1,224, and repairs £3,145, there remains £11,212, and £722 was brought in, making £11,934. The directors propose a further dividend of 10 per cent. (2s. per share), payable on November 23, making 15 per cent. for year; forward, £84. Meeting, Winchester House, November 20, at 12.30.

WALL PAPER MANUFACTURERS CO.—The report for the year ended August 31 last shows a profit of £635,681, to which is added £114,697 brought forward. The directors recommend a final dividend on the ordinary shares at the rate of 6 per cent., making, with the interim dividend, 10 per cent. for the year, and a dividend on the deferred shares at the rate of 10 per cent., transferring £100,000 to reserve fund, and carrying forward £223,088. The ordinary share registers will be closed from November 21 to 30, inclusive, for the payment of the final dividend.

SIMMER AND JACK PROPRIETARY MINES.—A profit of £42,536 was secured on the working of the mines for the year ended June 30, including the value of 4,783 oz. of fine gold recovered from tube mill plates due to change over to corduroy tables. Sundry revenue totalled £9,085, but there fall to be deducted exchange charges, taxes, sundry amounts written off, etc., the result being a net profit of £23,025. The balance of £52,437 brought in is added, and after deducting a sum of £31,440 for expenditure on property and equipment, the remaining £44,021 is carried forward. There was a net loss in the preceding year of £3,272.

LIVERPOOL NITRATE CO., LTD.—The profit for the year to June 30 last was £41,009, plus £17,221 brought in. After deducting £6,454 for increase of capital expenses, the directors recommend a final dividend of 2s. per share, less tax, making 3s. per share for year. The report states that nitrate manufacture was continued at oficinas Ramirez and San Lorenzo, and resumed at San Donato in January and Carmen Bajo in August last. The Buena Ventura property was sold for £120,000, used for reducing bankers' advances, and 57,725 shares were issued to shareholders at £2 10s. per share. For the year 1921-22 there was a loss of £79,550. No dividend was paid, but a share bonus of 300 per cent. was distributed out of the premium on shares account.

THE AMELIA NITRATE CO., LTD.—The gross trading profit for the year ended June 30 last was £3,647, plus income on investments, over-provision of income tax, and transfer fees £42,428, and £3,712 brought in, making £49,787. Administration expenses, interest, stoppage expenses, loss in exchange, and loss on realisation of old nitrate stocks totalled £41,037, leaving £8,750. After payment of preference dividend, there remains £5,750, which directors propose to carry forward. The report adds, trading profit resulted entirely from iodine, but greater part of old expensive nitrate stocks has during the year been realised (though at a loss), while balance of these stocks brought into new year will, on realisation, show a reasonable profit. The company restarted production in June last, and with this resumption of activities it hopes to have safely overcome past nitrate crisis, and the consequence prolonged and costly stoppage. It is proposed to subdivide the ordinary £10 shares into shares of £1 each, and resolutions will be submitted at the annual meeting to be held at River Plate House, 10-11, Finsbury Circus, London, on November 21, at noon.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

DRUGS AND CHEMICALS.—A commission agent of Barcelona is desirous of securing the representation of a British manufacturer of drugs, pharmaceutical and industrial chemicals. (Reference No. 546.)

PHARMACEUTICAL PRODUCTS FOR SWITZERLAND.—A Swiss firm at Geneva desires to secure the representation of United Kingdom manufacturers of pharmaceutical products or proprietary medicines. Correspondence in French. (Reference No. 547.)

Tariff Changes

AUSTRALIA.—A notice has been issued under the Customs Tariff (Industries Preservation) Act applying the dumping duty to caustic soda originating in or exported from the United Kingdom on importation into the Commonwealth. Under the notice, the dumping duty is applied to all such caustic soda entered for home consumption on and after August 4, 1922.

BULGARIA.—All goods may now be imported without special authorisation subject to payment of the appropriate duties. A surtax of 1,500 leva per kilog has been imposed on anethol in addition to the normal import duties.

POLAND.—The excise duty on acetic acid has been increased from 12,000 to 50,000 Polish marks per kilog per box of not more than 60.

PORTUGAL.—The export surtax on superphosphate has been fixed at 7 per cent. *ad valorem* for the quarter ending December.

RUMANIA.—The export of copper sulphate, pharmaceutical products and copper, lead and nickel in all their forms has been temporarily prohibited. Caustic soda may now be exported on payment of the existing duties and in accordance with special regulations.

Trade with Russia

MR. HUGH LEDWARD, of the British Commercial Mission in Moscow, will be in attendance at the Department of Overseas Trade until Friday, November 23, for the purpose of interviewing manufacturers and merchants interested in trade with Russia. Interviews can only be given by appointment and applications should be addressed to the Comptroller-General, Department of Overseas Trade, 35, Old Queen Street, London, S.W.1 (quoting the reference 5022 T.G.).

Concession to Importers of Chemicals in Peru

IT is announced that duties on chemicals, which have been levied hitherto at varying rates per kilogramme, are now to be subject to a common impost of 10 per cent. *ad valorem*, a concession of considerable value to foreign manufacturers.

The new rates are applicable only to consignments of over 500 kilogrammes.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

ACID PRODUCTS, LTD., Bradford. (M., 17/11/23.) Registered October 30, mortgage securing £960 and any further advances, to building society; charged on properties at Undercliffe Road and Airedale Street, Eccleshill. *——. December 31, 1922.

DIXON AND CARDUS, LTD., Southampron, oil and cake manufacturers, etc. (M., 17/11/23.) Registered November 2, debenture, to bank; general charge. *£1,400 debentures (collateral only). November 3, 1922.

ORGANAM, LTD. (late ELSTREE CHEMICAL WORKS (1922), LTD.), London, E.C. (M., 17/11/23.) Registered November 3, £2,000 debentures (filed under sec. 93 (3) of the Companies (Consolidation) Act 1908), present issue £300; general charge.

YOUNG (JOHN) (OF RADCLIFFE), LTD., manufacturers, bleachers, etc. (M., 17/11/23.) Registered October 31, debenture securing £35,000 and other moneys, to Belgrave Mills Co., Ltd., Honeywell Lane, Oldham; general charge. *£138,000. July 16, 1923.

Satisfaction

MORRIS AND GRIFFIN, LTD., London, E.C. chemical manufacturers. (M.S., 17/11/23.) Satisfaction registered November 1, all moneys, etc., registered July 25, 1921.

Receivership

OXIDE, LTD. (R., 17/11/23.) R. Carpenter, of Midland Bank Chambers, North Street, Brighton, was appointed receiver on October 24, 1923, under powers contained in debenture dated October 20, 1913.

London Gazette

Company Winding Up

HUGO STINNES, LTD. (C.W.U., 17/11/23.) First and final dividend of 20s. per £ to British creditors, payable November 15, 11, Ironmonger Lane, E.C.2.

Partnership Dissolved

WHITELEY AND CO. (Joe Maurice WHITELEY, Bertram HILTON and William ELLIS), chemical manufacturers and dealers, 103, Longwood Road, Huddersfield, by mutual consent as from November 5, 1923. Debts received or paid by J. M. Whiteley, who continues the business.

New Companies Registered

AFRICAN PIONEER AGENCY, LTD. Refiners of and dealers in petroleum and other mineral oils, natural gas, asphalte, ozokerite and naphthalene. Solicitors: Arthur Benjamin and Cohen, 23, College Hill, London, E.C.

BESSLER, WAECHTER, GLOVER AND CO.—Manufacturers and dealers in pottery, earthenware and chemicals; lime burners, oil refiners, etc. Nominal capital, £200,000 in £1 shares (98,000 "A" and 102,000 "B," 50,000 of the "B" shares being 6 per cent. cumulative preference).

DEPTFORD GLASS WORKS, LTD. Bottle manufacturers. Nominal capital, £1,000 in £1 shares. Solicitor: T. H. Goodwin, 14-15, Coleman Street, London, E.C.

FEATHERSTONE HAMMOND PARTNERS, LTD., 28, Victoria Street, Westminster, London. Technical, consulting and expert advisers, chemists, analysts, etc. Nominal capital, £12,600 in 12,000 preference shares of £1 and 12,000 ordinary shares of 1s.

GAS GENERATORS AND INDUSTRIAL FURNACES, LTD. Gas and chemical engineers. Nominal capital, £5,000 in £1 shares. Solicitors: Braund and Hill, 6, Gray's Inn Square, London, W.C.1.

KEY PRODUCTS, LTD. Chemical manufacturers, merchants, importers, exporters, etc. Nominal capital, £100 in £1 shares. A director: J. Key, The Haven, Wivenhoe, Essex.

THAMES BANK CHEMICAL WORKS, LTD. Manufacturers of synthetic chemicals, drugs, essential oils, etc. Nominal capital, £100 in £1 shares. A director: K. S. Low, 34, Queen Street, Hammersmith, London, W.6.

WALLPAPER SUPPLY CO., LTD., 44, West Street, Gateshead. Importers and exporters of and dealers in wallpapers, varnishes, colours, paints, white lead, zincs, resins, etc. Nominal capital, £3,000 in £1 shares.

Company Incorporated Outside the United Kingdom

UNITED CARBORUNDUM AND ELECTRITE WORKS, LTD.—Particulars have been filed at Somerset House of Spojené Závody pro Vyrobu Carberunda a Elektritu, Ack. Spol. (United Carborundum and Electrite Works, Ltd.). The capital is 15,000,000 crowns in 75,000 shares of 200 crowns each. The company was incorporated in Czechoslovakia, to acquire from the Austrian Landerbank at Vienna the Carborundum and Electrite Works and manufactory at Benatek, as at January 1, 1909, for 400,000 crowns, 250,000 being for the works and manufactory, and 150,000 for the patents, marks, samples, clients and contracts for delivery; to manufacture and deal in carborundum, electrite and other artificial grinding instruments in rough and worked-up state, electro-chemical, incombustible and insulation products, electrodes and other relative goods, grinding machines, etc. The British address is 72, Station Road, New Southgate, N.11, where T. E. Fowler of the United Carborundum and Electrite Works Co., is authorised to accept service of process and notices on behalf of the company. The directors are: V. Klement, Dresden; E. Strasser, F. Kaufmann, B. Steiner, K. Kress and A. Hecht, all of Czechoslovakia; M. Kraus, M. Rottor, J. Biro and K. O. Pollak, all of Vienna; and J. Bilinsky, Lwowa, Poland.

Arsenic Manufacture in Devon and Cornwall

IN the November issue of *Discovery*, Mr. Edward Cahen gives an interesting account of the rather primitive methods of arsenic manufacture in the West of England. The industry is a very old one and the product is noted for its great purity, for, although manufactured by the ton, it equals in purity the standards of Merck or Kahlbaum. The principal source of the arsenic is the silvery grey pyrites, called mispickel or, by the miners, white mundic, a mixture of iron sulphide and arsenide. This is either mined specially for the purpose or is obtained from the dumps of the copper and tin mines. These dumps form quite a lucrative source of arsenic, for the mundic, which is heavy, can be easily separated from the lighter material by washing with water on a James table or similar crude contrivance. The mundic is then taken to the arsenic works (a few old sheds and brick ovens) and burnt in a rotatory or reverberatory furnace which is kept constantly burning week after week in eight-hour shifts, until sufficient arsenic is collected in the receiving chambers. The fires are then drawn or the heating gases diverted by damper. The product of this first process is "arsenic soot" and is generally of a greyish colour, although it varies greatly from buff to black. Arsenic soot is also obtained from other industries in the locality, *e.g.*, tin-smelting. The soot is collected and passed to the refining furnaces which are heated with smokeless coal to avoid pollution of the refined arsenic. The chambers where the white refined arsenic is collected are small vaulted brick rooms connected one with another by an arched opening, so placed that the gases in their passage from one chamber to the next strike a relatively cool wall before passing to the exit in the diagonally opposite corner. The arsenic is finally ground between ordinary granite mill stones which are frequently driven by a water wheel, and the grinding is therefore effected by one of the most antiquated devices known to mankind. Much has been written of the unhealthy nature of the work, but the arsenic burners are as a rule a fine healthy lot of men.